THE RIVER BASIN WATER QUALITY MANAGEMENT PLAN FOR KENTUCKY

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Chapter I

INTRODUCTION

INTRODUCTION

The information and discussion presented in this report address the issue of the continuous planning process for water quality management, otherwise known as 303(e) Planning, as specified in the Federal Water Pollution Control Act Amendments of 1972 for the Licking River Basin in the Commonwealth of Kentucky. The 303(e) Planning process is intended to be a continuing process to be carried out by the States on a statewide basis to insure that each state has a continuingly relevant and viable management plan with regard to such water quality and waste treatment management issues as: the allocation of waste carrying capacity of streams, the establishment of discharge requirements, water quality standards, selected residual waste management, and an inventory and ranking, in order of priority, of needs for construction of waste treatment units.

Without question, there has been and continues to be, as evidenced by the multiplicity of approaches being taken to 303(e) Planning, considerable uncertainty as to exactly what the product of the 303(e) Planning process is to be at any point in time. The U. S. Environmental Protection Agency (EPA) in its transmittal letter for the September, 1974 Guidelines for the Preparation of Water Quality Management Plans (i.e. 303(e) Planning process product) notes that: "A 303(e) Plan is neither a broad water and related land resource plan nor a basinwide facilities plan. Simply stated, the basin plan is a management document that identifies the basin's water quality problems and sets forth a remedial program to alleviate those problems." The transmittal letter also notes that in essence, basinwide plans will provide for orderly water quality management by; identifying problems, determining priorities, scheduling actions, and coordinating planning.

The material presented in this report is certainly consistent with the above EPA interpretation of what 303(e) Planning is to produce, as well as being in accord with the dictates and suggestions of Section 303(e) of the Federal Water Pollution Control Act Amendments of 1972, 40 CFR 130 and 131, and the EPA guidelines for the Preparation of Water Quality Management Plans (September, 1974). The 303(e) Planning for the Licking River Basin is a single element in the statewide 303(e) Planning required for the Commonwealth of Kentucky. In overview, this report is intended to provide a perspective of the current status of water quality management in the Licking River Basin, a view as to how currently perceived water quality management problems in the Basin should be addressed, and consideration/recommendations as to what future planning/implementation efforts should be considered/pursued.

Public Law (PL) 92-500

The "Federal Water Pollution Control Act Amendments of 1972," otherwise known as PL 92-500, enacted in October, 1972 mandates significant changes in the heretofore accepted concepts and practices in the United States as regards water quality and water pollution control management. The changes are evident to a noticeable extent in the goals and policies specified in PL 92-500, some of which are as follows:

- It is the national goal that the discharge of pollutants into navigable waters must be eliminated by 1985.
- It is the national goal that wherever attainable an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by 1 July, 1983.
- It is the policy of the Congress to recognize, preserve and protect the primary responsibilities and rights of States to protect, reduce, and eliminate pollution to plan the development and use (including restoration, preservation, and enhancement) of land and water resources.

The above policy when considered within the overall character of PL 92-500 makes it clear that the option preserved for states is one of more stringent requirements than those of PL 92-500; the utilization of requirements less stringent than those of PL 92-500 to ameliorate local problems can only be achieved with great difficulty, if at all. In order to realize and implement the above and other goals and policies respectively, a large number of processes which must be undertaken and events which must be realized are specified in PL 92-500. The exact character of the preceding events and processes has been specified by EPA, in varying degrees, through the promulgation of numerous rules, regulations, policies, procedures, and guidelines.

To a large extent, particularly in the planning arena, the EPA emphasis has been on the promulgation of guidelines. Because they represent an interpretation by EPA as to what is required to meet the terms and conditions of PL 92-500, guidelines are less rigid and specific as to what is to be accomplished and how it is to be accomplished than other formats which could be used to promulgate EPA's perceptions of PL 92-500. Thus, the feasible zone for carrying out planning activities within the constraints/boundaries established by PL 92-500 tends to be at all times ill defined and in many instances highly variable. The lack of definition and high degree of variability are not necessarily bad, but they do place considerable importance on the use of rather sophisticated planning efforts and on continuous negotiations between and among all the participants in any given planning effort.

Potentially, the most far reaching aspects of PL 92-500 are those concerned with the allocation of the waste carrying capacity of receiving waters and with the use of specified minimum levels of waste treatment technology at all times and in all circumstances. The allocation process is concerned with all sources of pollutants, i.e. point sources such as municipal and industrial discharges and non-

point sources such as urban runoff, agricultural runoff, etc., and must be carried out on both a basinwide and areawide basis. The allocation process is a two pronged effort in that it must address how much waste can be discharged to a particular segment of a stream without applicable water quality standards being violated, and it must address how the total quantity of waste that can be discharged gets divided up among those wishing/needing to discharge waste. The land use and economic development implications of the allocation process are numerous and potentially extensive. The areawide allocation effort is a subset of the basinwide allocation process. The use of minimum levels of waste treatment technology means that all waste discharges -- point source under present interpretations must be subjected to a minimum level of treatment regardless of whether a lesser level of treatment would support a water quality consistent with the compatible and competitive beneficial and/or sustained uses being made of the receiving water.

To make the transition from the state of water quality and water pollution control management as they existed in 1972 to the state implicitly associated with attaining the 1985 goal of no discharge of pollutants, PL 92-500 mandates that the minimum level of treatment required for all waste discharges be progressively increased, and that the portion of waste carrying capacity allocated for use be progressively decreased. The preceding progressive changes are expected to be realized in three major steps: the first step is to be completed by 1977, the second step is to be completed by 1983, and the final step by 1985. Because 1985 is within current (1975) planning horizons, there is considerable concern as to whether or not the 1985 goal of so called "zero discharge" will become a waste treatment management operating objective, i.e., will the goal be converted to an operating policy. Given planning horizons and time requirements for implementation, it will be necessary, in the immediate future, for those responsible to decide the management realities of the 1985 goal of "zero discharge."

In considering the above issues of increasingly stringent requirements regarding minimum acceptable levels of waste treatment and diminishing allocation of waste carrying capacity of receiving waters, and in considering the 303(e) Planning process, it is important to recognize that the allocation process is a result of waste treatment technology available/required, i.e., the required level of waste treatment is not a result of the allocation process as has traditionally been the case. The shift in the roles of allocation and treatment technology clearly reflect the change in attitude toward the use of streams for waste carriage and/or assimilation embodied in PL 92-500. Prior to the enactment of PL 92-500 the use of receiving waters for waste carriage and/or assimilation was deemed appropriate insolong as it did not interfere with other uses of the waters within some framework of the commons. It is clear from the previously noted 1983 and 1985 goals, as stated in PL 92-500, that the use of navigable waters for waste carriage and/or assimilation is no longer to be considered as an a priori valid and legitimate use of such waters. It remains to be determined, as a result of planning and implementation efforts, exactly what the local, state, regional, and national consequence of the declared dramatic shift in attitude toward the use of navigable waters for waste carriage/assimilation will be in social, environmental and economic terms.

Because planning is assigned the responsibility of anticipating and precluding/circumventing future problems, the planning functions specified in PL 92-500 are key to determining the preceding consequences, in the indicated terms, with sufficient lead time to allow for adjustments to be made in the overall water quality management process as presently constituted, to assure attainment of desired and desirable end results with a minimum of undesirable side effects.

There are several planning processes specified in PL 92-500 each of which deals at a different level of specificity with regard to water quality and water pollution control management. The three primary planning processes are, as identified by sections of PL 92-500, the 303(e), 208, and 201 planning processes. The three planning processes are intended to be designed and operated such that each is a subset of the preceding. Thus, in general terms, 303(e) Planning (Continuous Basinwide Water Quality Management Planning) is intended to be carried out at the basin level on a statewide basis, 208 Planning (Areawide Waste Treatment Management Planning) is intended to be carried out within particular areas of a basin wherein significant water quality and/or water pollution control management problems either do or are expected to exist, and 201 Planning (Facilities Planning) is intended to address the planning (preliminary engineering) associated with wastewater and waste management facilities.

The 303(e) and 208 Planning processes are to be continuous processes wherein at any given time there exists a plan to guide management decisions, an intelligence system to gather information/data for use in both management actions and the planning process, and a process for updating both the plan and the intelligence system. Additionally, the two planning processes are tied together through a series of feedforward and feedback information loops; the former relates to the 303(e) to 208 information flow and the latter characterizes the 208 to 303(e) information flow. Presumably, the emphasis on planning as a process in both 303(e) and 208 Planning reflects the need for plans to be based on current conditions if they are to be of any value to management actions. However, care must be taken to insure that the planning process does not become so dynamic that it never exhibits sufficient stability to provide input to management decisions.

303(e) Planning

Section 303(e) of PL 92-500 mandates that each state shall have an approved continuing planning process which is consistent with the requirements of PL 92-500 in effect at all times. The initially developed continuing planning process had to be reviewed and approved by EPA, and the ongoing continuous planning process is subject to EPA review from time to time (annually) to insure the continuing consistency of the planning process with the requirements of PL 92-500. As described in PL 92-500, an acceptable 303(e) Planning process must include at least the following:

- Effluent limitations and schedules of compliance at least as stringent as those required in other relevant sections of PL 92-500.
- The incorporation of all elements of any applicable 208 and 209 Plans as defined in PL 92-500.
- Total maximum daily load for pollutants as defined in relevant sections of PL 92-500.

- Procedures for revision of the plan.
- Adequate authority for intergovernmental cooperation.
- Adequate implementation, including schedules of compliance for revised/new water quality standards as required in other sections of PL 92-500.
- Controls over the disposition of all residual waste from any water treatment processing.
- An inventory and ranking, in order of priority, of needs for construction of waste treatment works required to meet the applicable requirements of other sections of PL 92-500.

The implementation of 303(e) Planning has been delineated by EPA through the preparation and publication of three documents; Water Quality Management Basin Plans -- Policies and Procedures (40 CFR 130), Preparation of Water Quality Management Basin Plans (40 CFR 131), and Guidelines for Preparation of Water Quality Management Plans (September 1974). The information promulgated in the preceding documents is not entirely refined and definitive in character, i.e. considerable interpretation is required on the part of the user of the information. The preceding situation exists, perhaps at least in part, due to the lack of tradition in using a dynamic planning process as a key element of water quality and water pollution control management, and to the attempt to define both the initiation and ongoing procedures for 303(e) Planning in a single set of documents.

The organizing concept for water quality and water pollution control management within the 303(e) Planning process is the "segment." A segment is defined as a portion of a basin, the surface waters of which have common hydrologic characteristics, common natural biological, physical, and chemical processes, and common reactions to external stresses such as the discharge of pollutants. Two types of segments are recognized. Water quality limited (WQL) segments are those segments wherein the water quality will not equal or exceed the water quality defined by the applicable standards if the waste being discharged to the waters is subjected to the minimum acceptable level of treatment as specified by PL 92-500; i.e., to realize water quality equal to the applicable standards will require a higher degree of treatment than that provided by the minimum acceptable treatment level. Effluent limited (EL) segments are those segments wherein water quality equal to or in excess of the applicable standards will result if the waste discharges are subjected to the minimum acceptable level of treatment specified by PL 92-500.

Water quality and water pollution control management strategies, tactics, and operations resulting from 303(e) Planning are developed around segments and aggregations of segments. The aggregation can be either within or across basins, at least at the state level. Although segments are the organizing concept for water quality and water pollution control management resulting from 303(e) Planning, the definition of segments within a basin should be the final output from a 303(e) Planning process, i.e., the organizing concept for management cannot be the organizing concept for planning. However, in most instances, delineation of segments has been an early, if not the first step, rather than the last step, in the 303(e) Planning process. The reverse order used to define segments has severely constrained many 303(e) Planning efforts.

According to the September, 1974 Guidelines for Preparation of Water Quality Management Plans the 303(e) Planning process must embody the following elements for both WQL segments and EL segments:

- Inventory and ranking of significant dischargers.
- Schedule of compliance or target dates.
- Assessment of municipal needs.
- Residual waste control.
- Recommended water quality standards revisions.
- Planning relationships.
- Appropriate monitoring and surveillance programs.
- Interstate/Intergovernmental cooperation.

For WQL segments additional elements which must be embodied in the 303(e) Planning process are:

- Determination of total maximum daily load.
- Established or targeted load allocations and effluent limitations.
- Assessment of non-point sources of pollution.

In many instances, it may be advisable to do an assessment of non-point sources of pollution for EL segments as well as for WQL segments.

The determination of maximum daily loads, the development of load allocations, and the assessment of non-point sources of pollution for WQL segments, and the latter potentially for EL segments, define rather well what new factors PL 92-500 has introduced to water quality and water pollution control management and planning therefore. Maximum daily loads refer to the amount of pollutants that can be discharged to the waters of a WQL segment without violating the water quality standards. The maximum daily load is also referred to as the carrying capacity of the waters. Load allocation refers to dividing up the maximum daily load among those dischargers needing or seeking to discharge waste to the waters of the segment. Because all sources of pollutants must be considered in the load allocation process, the pollutants derived from non-point sources will have the effect of reducing the quantity of pollutants that can be discharged from point sources.

Based on prior discussion a segment is classified as WQL if the actual pollutant loads to the segment, when all waste discharges are being subjected to the appropriate minimum acceptable level of treatment are in excess of the maximum daily loads. Thus, the whole issue of which segments are WQL and which are EL would appear to be a rather simple and straightforward determination; however, such is not the case. The confounding circumstances include:

- In the above discussed definition of a segment what "common" means in terms of hydrology, biological processes, chemical processes, physical processes, and response to external stresses is left undefined. Thus, depending on what variation one is willing to accept as common, it is possible for a segment to range anywhere from a few feet of stream and associated drainage area to an entire stream basin. That is, the definition of a segment does not encompass any unique specifications. Thus, what constitutes a segment within any given basin is a subjective determination.
- The fact that pollutants are of two general categories: conservative and non-conservative. Conservative pollutants are those which do not change character on being discharged to a receiving water. Thus, the quantity of non-conservative pollutants, such as BOD, NOD, etc., which can be discharged to a water without violating

a water quality standard increases as the uniformity of the discharge along a stream increases.

- Water quality standards, which are only partially determined by technical considerations, have a large role in ascertaining the maximum daily loads, and whether or not a segment is WQL.
- Whether or not the pollutants from non-point sources are included or excluded from background water quality conditions. If non-point sources are excluded then a WQL segment might well become an EL segment.
- The mathematical models used to predict the maximum daily loads and the impact of discharges on water quality. Inasmuch as it rarely occurs that water quality has been monitored in detail under the critical conditions, it is necessary to use mathematical/computer models to estimate the maximum daily loads and discharge impacts. Models are only approximations of the real world. If a model errors on the conservative side then facilities will be built with capabilities in excess of that required, if a model errors on the liberal side, then facilities will be built which do not provide for the necessary water quality; in either case, money is wasted. Also, if model errors are on the conservative side, a segment might be designated as WQL when in fact it is EL, a model error on the liberal side would produce the reverse situation.

Another particularly sticky issue in 303(e) Planning is the process used to allocate the total maximum daily loads among the competing dischargers. Although, all the documentation pertaining to 303(e) Planning either infers or "waxes eloquent" about allocation, none provide any criteria as to how to accomplish allocation. The omission is significant in that each of the potential allocation policies would result in totally different allocation patterns, and thus, different waste management cost to the dischargers. For non-conservative substances, the allocation issue tends to be a local or within segment one, for conservative substances the allocation issue is a basinwide one. Every pound of conservative pollutant released by a discharger at any point along a stream means that there is one less pound of that pollutant that can be discharged by any downstream discharger.

The manner in which pollutants derived from non-point sources are dealt with has a strong impact on the allocation process, and on the impact the allocation process has on the social and economic parameters of an area. If the non-point sources are not considered in the allocation process, and are assumed to be contributing to the background water quality, then the total maximum daily loads will be reduced by the daily mass emission rates of pollutants from non-point sources; in such a situation the allocation, albeit informal, to non-point sources is 100 percent of the waste load demand created by such sources. If non-point sources are formally included in the allocation process, it implies that the allocations, given an allocation policy, can be optimized, and that either control of non-point source or treatment of waste from non-point sources or both are feasible/attainable.

It should be apparent from the above and preceding discussion that 303(e) Planning is a dynamic as well as continuous process, and that it can have a tremendous impact over time on the social, economic and environmental characteristics and equities of an area at both the segment and basin level. The process is dynamic because there is very little that is fixed or uniquely defined in the process; that is, the delineation of a segment is subject to considerable subjective evaluation, the determination as to whether a segment is WQL or EL is dependent on how a number of variable parameters are allowed to vary and the modeling technique employed and the allocation process within a segment or within a basin could be the result of either an implicit or explicit allocation policy unique to either the segment or the basin, or both.

The impact on the social, economic, and environmental characteristics and equities of an area will be determined primarily by the manner in which segments are delineated and classified, and the manner in which the total maximum daily loads are allocated at the basin level for conservative pollutants and at the segment level for the non-conservative pollutants. Water pollution control management is less demanding and less costly for EL segments than it is for WQL segments. Significantly different patterns of cost incidence result depending on whether or not non-point sources are formally considered in the allocation process. Significantly different options exist at the local level depending on whether allocations are made to dischargers or discharges.

In addition to the 303(e) Planning process being dynamic at any point in time it can also be expected to be dynamic over time; more than is implied by the continuing planning process connotation. The incremental advantages created between segments within and among basins relative to social, economic, and environmental opportunities by the implementation of any given 303(e) Plan will result in spatial shift in both the character and intensity of social, economic, and environmental activities between segments over time. The shifts will result in new/greater water quality and water pollution control management pressures which will have to be dealt with in future 303(e) Planning efforts. Changes in water quality standards and increasing social and economic development will result in more and more WQL segments and fewer and fewer EL segments with the consequence that dischargers will become increasingly sensitive to the character of all dimensions of the allocation process. And finally, the implementation of the 303(e) Planning process results, at any level of sophistication, will result in the initiation of the development of social, economic, and environmental linkages within a basin that may not have companion linkages in any other dimension of the societal and economic structure in a basin. Thus, the implementation of any 303(e) Planning output is going to set in motion forces which will change the environment for future 303(e) Planning, and forces whose implications and impact will have to be dealt with by future 303(e) Planning activities. The feedforward and feedback dynamic aspects of the 303(e) Planning process make the continuing process much more than updating data bases to fine tune an existing plan.

The ideal approach to 303(e) Planning would involve the development of profiles and, spatial displays, and response surfaces illustrating the magnitude and character of each of the social, economic, political, and environmental parameters which should affect and be affected by 303(e) Planning as they currently exist. They illustrate the

changes in the magnitude and character of the parameters which result from the application of different segment definition and allocation policies. The parameters of interest would include tax base, the gradient in tax base in a basin, value added by different economic activities, waste generation per unit of value added for different economic activities, employment, water quantity and quality, excess carrying capacity, cost of alternative water quality management systems, recreational use and pressure, mineral resource development pressure, water demand, and alternative development patterns and mixes. The expected results of implementing alternative segment definition and allocation policies within a basin could be given to the decision makers for examination and selection of the policies, or for formulation of additional alternative policies requiring assessment and examination. The process would be repeated until the decision makers found a policy which would produce the desired local results and adhere to state and Federal constraints.

Unfortunately, within the multiple requirements placed on the 303(e) Planning process, there is insufficient time, money, and resources to pursue any given 303(e) Planning effort in the ideal context, particularly during the period when most 303(e) Planning is in the early stages, i.e., the second or third update, and the major focus is on getting a cohesive process together and started. Because of the dynamic and continuing character of the 303(e) Planning process, if the ideal approach cannot be pursued, it does not make a "whole lot of difference" where or how the process is started, just so it gets started, and techniques which provide for expansion, revision, etc. over time are employed. That is, by taking a first step in the 303(e) Planning process and implementing the output certain things will be accomplished and/or set in motion. Knowing the character of the first step and the consequence of its implementation allows one to make adjustments during the second step to insure that the process and its output get closer to what is desired. Pursuing the preceding process long enough will result in a convergence on the desired 303(e) Planning process and on realization of the desired implementation results. The key to the success of the sequential convergence approach is to have a consistent, but flexible, framework within which the effort constantly pursued, i.e. the framework becomes the organizing concept for the process. The 303(e) Planning process that the Commonwealth of Kentucky has selected is of the preceding character. It is recognized that the 303(e) Planning process is not going to be brought up to full and final operating status in a single, or even several, steps, thus, it is the intent of the Commonwealth to continually improve the process and insure that each successive step reflects what has been done and learned from prior steps.

In appreciation of the above described characteristics of 303(e) Planning and of the approach being pursued by the Commonwealth of Kentucky, the firms of Proctor, Davis, Ray, and W. E. Gates and Associates, Inc., who were responsible primarily for the land based 303(e) Planning for the **Licking River Basin** elected to use a system called ADAPT to carry out the 303(e) Planning effort for **the Licking River Basin.** ADAPT (Areal Design and Planning Tool) was developed by personnel of W. E. Gates and Associates, Inc. for use in land based planning efforts where flexibility in data management, data use, and alternative examination is required. ADAPT was used with knowledge, concurrence, and support of the personnel of the Department of Natural Resources and Environmental Protection of the Commonwealth of Kentucky.

ADAPT

ADAPT, an acronym for Areal Design And Planning Tool, was developed by personnel of W. E. Gates and Associates, Inc. expressly for the purpose of water quality and water pollution control management planning and management studies. ADAPT represents an integrated aggregation of assumptions, organizing concepts, approaches, data management techniques, data representation techniques, planning design techniques, and costing techniques specifically designed to deal with the land based aspects of water quality and water pollution control management planning, and specifically designed to interface with any of the multitude of water based data analysis and modeling techniques available for water quality and water pollution control management planning and management.

The heart of ADAPT is a triangular shaped grid system. Each element of the triangular grid system, alternatively referred to as a triangle, Unit Planning Area, or ADAPT cell, can be sized to meet either the data management needs or the decision-making needs or any combination thereof. Because the ADAPT cells, or Unit Planning Areas, are triangular in shape they can be used to develop a digitized terrain model, i.e. topography of an area can be represented and characterized such that it can be stored as part of a data base in a computer. Once the topographical data is stored in a computerized data base it is then possible to use the computerized data base and various other computer models to rapidly design and cost sewer systems, interceptor systems, and any other system whose design and cost is dependent, to some degree, on topography. With regard to other parameters, the ADAPT cell or Unit Planning Area, is designed to be homogeneous with respect to all parameters at the level of planning and/or management being pursued. What constitutes homogeneity for 303(e) Planning is different than what constitutes homogeneity for 208 or 201 Planning, and there is a homogeneity difference between the latter two. Thus, the size of the ADAPT cells can be adjusted to fit the aggregation of the planning and/or management effort, and, because each ADAPT cell within an overall grid can be of a different size and shape, it is possible to adjust the size of each cell to meet the demands for data management and/or decision making needs. In areas where either there is little or no data or the decisions are being made at a very aggregate level, the size of the ADAPT cells can be very large; in areas where there is either a lot of data or decisions have to be made at a very fine scale, the ADAPT cells should and can be very small. Additionally, as conditions change and the needs for data management and decision making change any given ADAPT cell can be subdivided into smaller ADAPT cells without affecting any other aspect of an existing ADAPT system data base.

In addition to the above attributes ADAPT also incorporates a stream or sewer network which defines a transport system to serve each individual ADAPT cell within the ADAPT grid system. The network provides a means for assessing the collection and

routine of runoff and wastewaters.

ADAPT is generally designed in each situation, so that the ADAPT data base can be examined using any of a number of common denominators. The selection of the exact common denominators and the number thereof, is determined by the specific application and level of planning/management. For the 303(e) Planning process, ADAPT has been set up such that the data base can be accessed by segment, county, incorporated area, basin, existing sewer service area, Intensive 201 Planning area, and Outer 201 Planning area. Also the data base can be interrogated in terms of any parameter stored in the data base. Thus, graphical and/or tabular output can be obtained indicating those ADAPT cells possessing any particular attribute, i.e. urban areas, served by existing sewer systems, soil type, woodlands, etc. For the 303(e) Planning process, it is possible to determine the magnitude of any parameter tributary to a point along the main stream in any segment.

Although it was not used in this cycle of the 303(e) Planning process, ADAPT has the capacity to support a wide range of planning design and costing models. Some planning design and costing models are incorporated into ADAPT, others required for specific situations can be readily added to the basic ADAPT system. For purposes of providing input to water quality models, ADAPT can be used to define the domestic and/or industrial wastewater and/or runoff flows and loadings being routed to any particular location along a stream; the routine and discharge points being determined by alternative waste management schemes and natural drainage patterns.

In the present cycle of the 303(e) Planning process, the major emphasis was placed on the data management and manipulation capacities of ADAPT, and to some extent on its use for developing preliminary estimates of runoff pollutant loading in the Licking and Big Sandy River Basins. Current plans call for the extension and expansion of the ADAPT system and its capacities for use in a multitude of planning processes in the Commonwealth of Kentucky, its basic performance capability having been established by the Licking and Big Sandy River Basin Planning efforts.

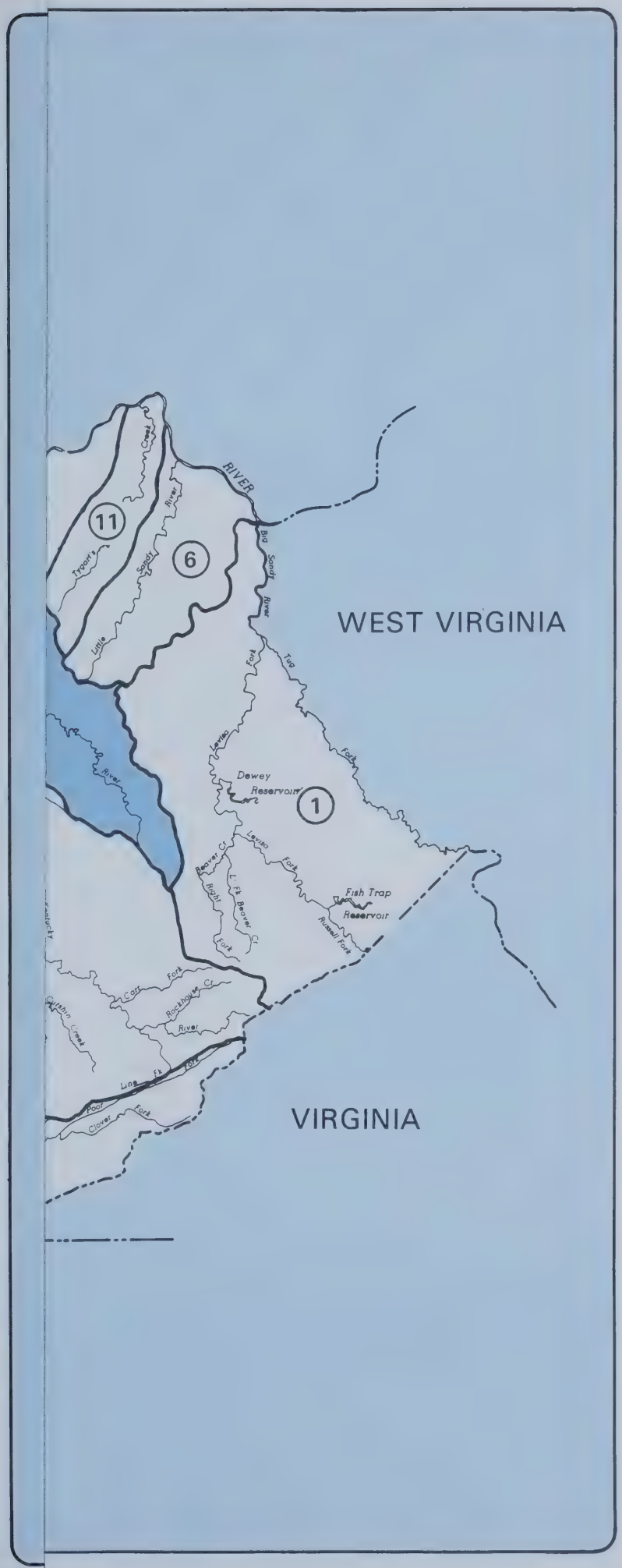
LICKING RIVER BASIN

As shown in Exhibit 1.1m the Licking River Basin is located in the northeast quadrant of the Commonwealth of Kentucky. The Licking River is a second order tributary within the Ohio River Basin. The headwaters of the Licking River are in Magoffin County, Kentucky, with the actual origin of the River being at the southernmost tip of Magoffin County. From its origin in Magoffin County, the River flows northwestward out of the coal region of Kentucky, through the bluegrass region, finally reaching the Ohio River in the Greater Cincinnati Metropolitan area, over 300 miles from its origin. Cave Run Lake is the only significant water resource development project on the Licking River; however, construction of Falmouth Lake, downstream of Cedar Run Lake, is being contemplated. If Falmouth Lake is constructed, the dominant aquatic environment in the Licking River will be shifted from a lotic environment to a lentic environment. The shift in the character of the environment would have an expected impact on the associated aquatic ecosystems.

The Licking River Basin is bounded on the north and east by the Ohio River and Big Sandy River Basins, and on the south and west by the Ohio River and Kentucky River Basins. The Basin encompasses an area of about 3,700 square miles, which represents approximately ten percent of the area of the Commonwealth of Kentucky. The hydrologic character of the Basin in combination with the lack of River development gives rise to widely varying flows in the Licking River. The average discharge for the River is about 4,500 cfs (cubic feet per second) at its mouth; whereas, the 7 day 10 year minimum flow is 75 cfs, and extreme discharge values range from a low of 3 cfs to a high of 100,000 cfs.

The Licking River Basin, as shown in Exhibit 1.2m encompasses all or parts of 22 counties and portions of seven Area Development Districts (ADD's). The major urban area in the Basin is the Northern Kentucky Area, including and extending outward from Covington and Newport, and within the Greater Cincinnati Metropolitan Area. The present Basin population is approximately 277,000 persons, and is expected to increase to 378,000 persons by 1995. It is anticipated that fully two thirds of the 1995 population will reside in urban areas. Total nonagriculture employment in the Basin is 57,000 employees, with the two major sources of employment being manufacturing and government, each at about 14,000 employees. The total nonagriculture employment is expected to essentially double by 1995. The difference in the expected increase in population and the expected increase in the nonagriculture employment clearly reflects an expected shift away from an agriculture oriented society/economy to an urban/industrial/commercial oriented society/economy within the Basin. At present, there are 15 municipal wastewater treatment facilities in the Basin with a combined capacity of 8.9 mgd and a combined flow of 7.7 mgd. Approximately 50 percent of the existing Basin population resides within existing sewer service areas. The major wastewater generation area, i.e. Northern Kentucky, discharges the bulk of its wastewaters to the Ohio River Basin.

In summary, the Licking River is a major but not commercially significant water resource in the Commonwealth of Kentucky, particularly when it is compared to some of the highly developed water resources in the Commonwealth. The expected urbanization/industrialization in the Basin will both increase the water pollution related stress on the resident aquatic ecosystem and raise the social expectations for a high quality water resource. It is probable that the major 303(e) Planning and implementation problem will be that of sustaining equality in the treatment dischargers while moving the water quality management program forward according to the mandates of PL 92-500. It is also probable that increasing national demands for coal will result in considerable changes in the character of water quality and water resource problems in the upper portions of the Licking River Basin. The trend of the preceding pressures should be well established by the time the next 303(e) Planning process cycle has to be carried out.



LICKING RIVER BASIN

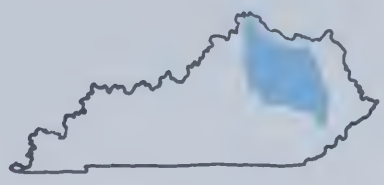


EXHIBIT 1.1m

BASIN LOCATION

LEGEND

KENTUCKY DRAINAGE BASINS

1	BIG SANDY
2a	LOWER CUMBERLAND
2b	UPPER CUMBERLAND
3	GREEN RIVER
4	KENTUCKY RIVER
5	LICKING
6	LITTLE SANDY
7	MISSISSIPPI
8	OHIO MINOR TRIBUTARIES
9	TENNESSEE
10	TRADEWATER
11	TYGART'S CREEK
12	SALT RIVER

10 0 10 20 30 40

GRAPHIC SCALE IN MILES

Base Data: U S Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PROCTOR-DAVIS-RAY
Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.

LICKING RIVER BASIN

EXHIBIT 1.2m

AREA DEVELOPMENT DISTRICTS

LEGEND

10 0 10 20 30 40

GRAPHIC SCALE IN MILES

Base Data: U. S. Geological Survey

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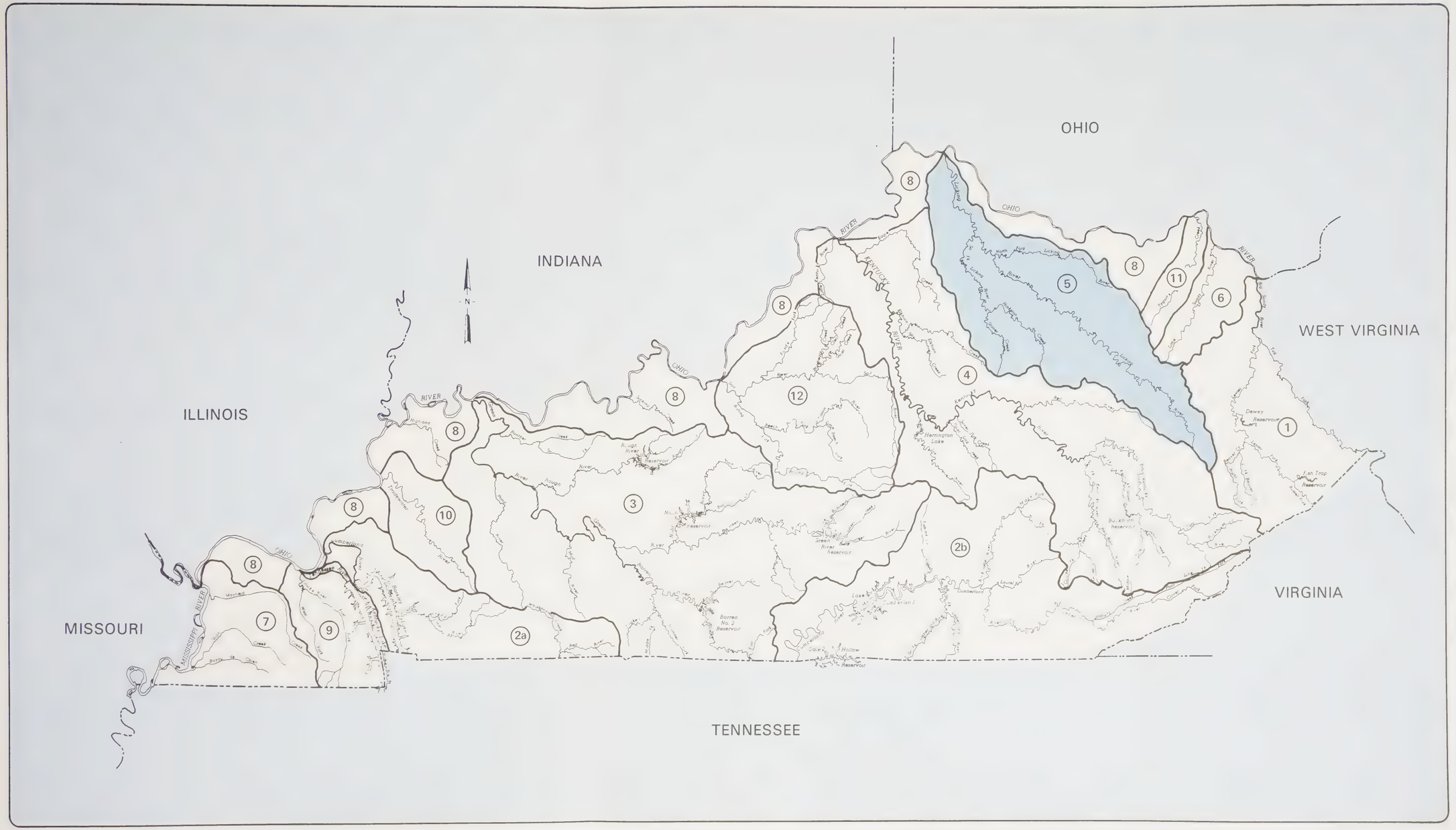

LICKING RIVER BASIN

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303(e) PLANNING OVERVIEW FOR BASIN

For purposes of the current phase of 303(e) Planning the Commonwealth of Kentucky was divided into 10 river basins. A total of eight consultant contracts were let to assist the Commonwealth of Kentucky with the current cycle of the 303(e) Planning effort. The eight consultants contracts represented a total of 10 consulting firms. Except for the Licking River and Big Sandy River Basins which were addressed by a single consultant contract, and the Tennessee River and Mississippi River Basins, which were handled by a single consultant contract, a single consultant contract was let for each river basin. In addition to the private consultants, the services of Dr. E. G. Foree of the University of Kentucky (Lexington) and Dr. R. E. Stewart of the University of Louisville were obtained by the Commonwealth of Kentucky to; obtain field data to permit calibration of the "backwater" or "slope" model for selected water quality parameters to Kentucky streams such that the model could be used for 303(e) Planning, to define and specify the waste treatment alternatives to be used in the 303(e) Planning process, to define the critical hydrologies for the streams of concern, to determine the impact of existing point source discharges on existing water quality, and to make the characterization and documentations of the waste load allocations. The activities of the private consultants and of Drs. Foree and Stewart were under the immediate supervision of Mr. W. C. Martin, Chief Sanitary Engineer, Division of Water (Quality), Department for Natural Resources and Environmental Protection, Commonwealth of Kentucky.

The basic management and organizing techniques for the total 303(e) Planning effort were; the use of a single project evaluation and review document and technique for all basins, monthly consultant meetings attended by the private consultants and Drs. Foree and Stewart and chaired by Mr. Martin, and the use of subcommittees composed of consultant representatives, including Drs. Foree and Stewart, to address issues and problem, and specify the manner in which such would be addressed by all consultants. Deviations from the group approach were considered and granted or not on an individual basis; eng. the use of ADAPT for the Licking River and Big Sandy River Basins was permitted on the basis that it would not be used as a significant substitute for any of the activities or products required for the other basins. Similarly, specific types of deviations were considered at the request of other consultants for other basins.

It seems likely, based on the knowledge and insight gained during the current 303(e) Planning effort, that future 303(e) Planning efforts could benefit from more emphasis on coordination and less emphasis on continuity and group decision making. Also, it seems likely that there are benefits to be gained by not splitting the responsibility for future 303(e) Planning along media lines.

In spite of the above noted concerns, the current 303(e) Planning process did produce a product which addresses the EPA requirements for 303(e) Planning, and which can serve as a reasonable basis for future cycles of the 303(e) Planning process.

Chapter II

SUMMARY

The Water Pollution Control Act Amendments of 1972 (Act), Public Law (PL) 92-500 introduced a new era in water quality and water pollution control management in the United States. The stated objective of PL 92-500 is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To provide a context for the objective two national goals are specified in PL 92-500; (1) by 1985, the discharge of pollutants to navigable waters is to be eliminated, and (2) by 1983, wherever attainable, water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the waters shall be achieved.

In order to realize the stated objective and goals numerous processes and events that must be pursued in the course of attaining the necessary calibre of water quality management are specified in the Act. The management and operational aspects of the Act are designed to be guided by the output of a series of planning activities, the planning activities are, by reference to sections of PL 92-500, 303(e), 208 and 201 Planning. In concept, at least, it is the intent that 303(e) Planning provides a framework for 208 Planning, and the latter provides a framework for 201 Planning. In response to Section 303(e) of the Act which states, in part, that "each state shall have a continuing planning process ... which is consistent with this Act," 303(e) Planning is to address program planning required by state water quality management programs, and remedial programs required to resolve water quality management problems at the basin level on a statewide basis. The 208 Planning process is designed to address areawide waste treatment management problems, an area being some portion of a basin. The 201 Planning is to produce what has traditionally been referred to as the preliminary engineering associated with the design of waste treatment facilities.

The 303(e) Planning process is a continuing process which must be maintained in an updated state by the states. The planning process and its outputs is subject to routine review by the U. S. Environmental Protection Agency (EPA), and must include:

- Effluent limitations and schedules for complying with the limits.
- Incorporation of all relevant elements of 208 and 209 plans.
- Total maximum daily load for pollutants.
- Procedures for plan revision.
- Authority for intergovernmental cooperation.
- Water treatment residual waste control measures.
- Priority ranking of needs for construction of waste treatment systems.

The EPA has promulgated considerable information pertaining to what 303(e) Planning is about and how it is to be accomplished. The first 303(e) Planning output was due about 30 June, 1973, and has been subject to annual update, on a fiscal year base since then.

For the current 303(e) Planning effort in the Commonwealth of Kentucky, the State was divided into ten River Basins, and eight separate consultants or consultant teams were retained to assist the Department for Natural Resources and Environmental Protection (DNREP) in the current update of the planning process. Assistance was also provided by personnel from the University of Kentucky and the University of Louisville. The structure and management of the overall 303(e) Planning effort required monthly meetings involving the consultants, DNREP personnel, EPA personnel, and others. The intent of the monthly meetings was to insure commonality of approach, data generation, and data utilization. Subcommittees comprised of representatives of some or all of the preceding participants were established to deal with specific issues. On request by the consultants variance to the common approach was considered for specific basins. Some variances were allowed as substitutions, and some were allowed as "in addition to" type activities.

Because the 303(e) Planning process is a dynamic and continuing porcess one of the above variances was made for the Licking River Basin to permit the use of a computerized planning tool called ADAPT (Areal Design and Planning Tool). The ADAPT system results in all pertinent planning data (i.e. population, housing, topography, land use, economic/financial data, waste loads, soils, etc.) being stored according to a grid system comprised of variable sized "unit planning areas" or ADAPT cells (the average size ADAPT cell for the Basin is 0.7 square miles). The data is codified such that it can be assessed, manipulated and summarized based on a wide range of common denominators (segments, counties, basins, cities, urban areas, 201 areas, existing sewer service areas).

Additional capabilities of ADAPT include the capacity to evaluate nonpoint source loadings; to determine capital and operation and maintenance costs of sewer system alternatives; to estimate impacts of alternate development patterns on water quality and water quality management; etc. All of the basic data shown in this report has been established in the ADAPT system, and many of the tables and figures presented in this report were prepared directly by the ADAPT system. Should any changes modifications or expansions be necessary, the ADAPT system provides the capability to quickly obtain and utilize, the data, as necessary for water quality management.

MANAGEMENT PLAN

The current planning cycle for the Licking accomplished two basic objectives while meeting the requirements of PL 92-500. The initial basinwide data base was prepared and the basic framework for proceeding with the continuing planning process was established in ADAPT. The other related efforts in the 303(e) process also reflect to a considerable extent, the first steps in the evolution of a

management planning process. The management planning process as it currently exists is not meant to be and should not be taken as, the final effort. The process can and should be continually upgraded and refined as the information, goals, objectives and techniques for planning change.

The three major elements of the 303(e) continuing management process are segmentation, allocation and prioritization. Within each basin plan the unifying management element is to be a water quality management "segment." Although considerable effort has been expended to define what a segment is, what its boundaries are to be, what classification it ought to receive, etc., the final resolution to each of these issues remains largely a subjective decision. The definition of a segment is given as: a portion of a basin (land and water) the surface waters of which have common hydrologic characteristics and common natural biological, physical and chemical processes, and common reactions to external stresses (e.g. waste discharges). The terms "common processes" and "common characteristics" lend themselves to subjective determinations. These terms may be further compounded by the technical approaches used in the process. These may include: the use of mathematical models for which there has not been complete documentation of all critical conditions; the inclusion of nonpoint pollutant factors in a general, subjective fashion for lack of a better capacity to estimate these values; and the application of water quality standards that are only partially determined by technical considerations.

The subjective nature of the segment definition and the technical limitations make it imperative that the segmentation be a flexible process. Because the segment does represent a management tool, segments should be evaluated, revised and kept current with the changing conditions in the Basin relative to economic, political, discharge location, land use practice, and mining operation factors. The Licking Basin has been divided into 40 segments. Of the total, eleven segments were classified as "effluent limited," for which the application of secondary treatment for municipalities and best practicable treatment for industries will be sufficient to achieve water quality objectives. The remaining 29 segments were classified as "water quality limited," for which the application of the above minimum acceptable levels of treatment will not meet or exceed the applicable water quality standard. Many of the segments were designated as water quality limited because zero flow or low flow streams necessitated a higher level of treatment to assure that at the point of discharge the in stream concentration of ammonia will not exceed 4 mg/l. Because a number of the smaller streams in the Licking were of moderate to steep slope, the mathematical modelling indicated only a few cases where the in stream dissolved oxygen concentration was depleted below the stream standard of 5.0 mg/l, at BPT.

Allocation of the capacity of a stream to accept pollutant loadings is also a major portion of the 303(e) Planning effort. This allocation must be completed for water quality segments and should be an iterative process that evaluates a number of alternative measures to achieve the desired water quality conditions. In the current planning cycle, the waste load allocation process was based on the information produced from the mathematical modelling efforts of the University of Kentucky and the University of Louisville. These efforts resulted in the specification of requisite treatment levels for all dischargers in the Basin. The modeling effort was limited to two model runs for the Basin for 1980 discharge conditions. Using the model output, costs for each municipal treatment facility and collection system were estimated. In the Licking Basin there are projected to be 20 municipal treatment facilities in 1980. The total estimated costs for construction of the collection systems, interceptors, treatment plants and combined sewer improvements is $38.0 million. The largest single need is for Winchester, which is estimated to need $6.92 million in additional facilities.

The final step in the process was the prioritization of the water quality problems (segment priorities) and the municipal treatment requirements (municipal discharge priorities). The Kentucky Department for Natural Resources and Environmental Protection, in agreement with the EPA, developed specific formulae for the calculation of both segment and municipal priorities. Of the 40 segments in the basin, two were considered to be of "high priority" (i.e. priority rating of greater than 1,000) for addressing water quality problems. These were segment 20 (Strodes Creek from Stoner Creek to its headwaters) and Segment 16 (Hinkston Creek, its entire drainage basin). Additionally, eight segments were medium priority (priority rating between 200 and 1,000), and the remaining 30 segments were determined to be of low priority (priority rating less than 200).

Municipal priority values in the Licking Basin ranged from 0.0 for Falmouth to 5,769.5 for Winchester. The priority relationship was based on an equation considering the segment priority and a weighted relationship considering the costs for each required expansion/modification/construction to the sewer/sewage treatment system in the municipality. The more stringent the treatment requirements, the larger the factor assigned to the treatment plant costs. Of the twenty municipal discharges in the Basin, it is estimated that for seven of these secondary treatment will be sufficient through 1980. These include: Millersburg, Cynthiana, Paris, Bath County Water District No. 2, Butler, Taylor Mill and Falmouth. However, the remaining thirteen municipal discharges have been estimated to need higher levels of treatment to meet water quality requirements in 1980.

Chapter III

BACKGROUND FOR THE PLAN

The character of the 303(e) Planning process is described in Chapter I. The discussion and information presented in this Chapter are concerned with characterizing the social, economic, and physical parameters which are directly and indirectly correlated with water quality and water quality management problems in the Licking River Basin, and with characterizing the social, economic and physical environment within which the results of the 303(e) Planning process will have to be implemented. The issue of desired versus currently and readily available social, economic, and physical parameter data is discussed in the subsequent sections of this Chapter.

CONTEXT FOR BACKGROUND DATA/INFORMATION

In essence, the purpose of the 303(e) planning process is to establish a basis for a water quality management program at the basin level on a statewide basis; and to, at any point in time, establish a basis for future 303(e) Planning, and other planning efforts occurring at more disaggregate and specific levels.

In executing a 303(e) Planning process, and the water quality management programs resulting therefrom, it must be either explicitly or implicitly recognized that the water resource is a finite resource and an integrator, in some manner, of all man's land based activities, whereas the land resource is of essentially unlimited capacity (within the limits of the economic investment required to develop/use a particular site). The water resource has a finite capacity relative to its ability to support the activities of man whether they be social or economic or combinations thereof. The capacity of a water resource to support man's activities is referred to as the carrying capacity of the resource. The carrying capacity changes with activities; waste treatment management serves to enhance the apparent carrying capacity by reducing the stress any particular unit of activity places on the water resource. Water quality management involves both the determination and allocation of the quality related carrying capacity of a particular water resource. Certain aspects of the quality related carrying capacity are renewable and certain are not. The activities which must be considered in the allocation of the quality related carrying capacity of a stream include:

- Agricultural activities and runoff.
- Urban development and resultant wastewater and runoff.
- Industrial/commercial development and resultant wastewater, cooling water, and site runoff.
- Reaeration uses.
- Fish and wildlife protection and propagation.

Because social, economic and political factors have such a strong influence on what constitutes a water quality problem and the character of an acceptable solution to the problem, there are no unique or singular solutions to a given specific or generic type water quality management problem. Thus, a water quality management program must have the capacity and data base necessary to identify the social, economic, and environmental implications of any given water quality management strategy, and to identify the water quality management implication of various social, economic and environmental strategies and combinations thereof. What constitutes an acceptable combination of social, economic, environmental, and water quality management strategies is ultimately decided in the political arena.

The management program capacity to permit identification of the above noted implications-strategy relationships can be acquired by having a planning, planning design, and costing process which is subject to a minimum of technical and operational constraints; i.e., a process which constrains neither the alternatives which can be examined nor the data bases that can be used/generated. ADAPT, as discussed in Chapter I is such a process. At present, the data base required to permit formulation of the strategies, delineation of the implications, and examination of the implications - strategy relationships must be assembled from a wide range of existing data bases which for the most part have been developed and maintained for purposes other than water quality management. The data base problems are several fold; in many instances, there is little insight as to what measure of an activity most directly and clearly defines the impact of the activity on water quality and vice versa; until most recently water quality management decisions have not been of such a character to warrant the development of separate data bases specific to water quality management decision making. At some point in the water quality management process, normalized/average values are of limited utility in the decision making process and there has been very little effort expended to monitor the performance of water quality management programs in terms of the data/information used to initially formulate the programs.

As the allocation of the resources among the users becomes increasingly more stringent and the cost of waste management increases, it is inevitable that measure of activities which correlate closely with water quality will be developed. For example, employment, which is a rather poor measure of an industry's wastewater generation, will ultimately cease to be used as a measure of industrial activity for water quality management planning and decision making; the economics will make the inaccuracy and lack of precision of the measure intolerable.

It seems inevitable that the continuing planning process mandated by PL 92-500, specifically 303(e) Planning and 208 Planning, are going to cause water quality management programs and the ramifications thereof to be monitored in terms of the planning data base that was used to formulate the programs. If the monitoring effort is not pursued, it will be impossible to maintain continuity in the planning process, and to improve the quality of the planning process. Thus, the continuing planning processes can be expected to generate data bases uniquely related to water quality management planning and im-

plementation. The monitoring required to do continuing planning should also result in continual refinement of the character and composition of the data bases as the consequence of implementing decisions based on a given data base are compared to the expected results of implementing decisions.

This cycle of the 303(e) Planning process for the Licking River Basin was developed around the more traditional data base associated with water quality management planning. As noted above, the evolutionary forces of the continuing planning process will result in considered changes in the data base over time. The data bases incorporated into this cycle of the 303(e) Planning process included:

- Physiographic data - topography, geology, and soils data.
- Hydrologic Data - surface waters and groundwaters.
- Demographic Data - population, housing and employment.
- Land Use Data - surface area and land use patterns and categories.

PHYSIOGRAPHY

The elements of the physical geography of the Licking River Basin that were considered and interpreted in the development of the initial 303(e) Planning process are the: physiographic regions; geology; topography; and soils.

Physiographic Regions and Geology

Data Sources

The information resources used to characterize the physiographic regions and geologic features of the Licking River Basin were two composite maps, one entitled "Land Areas of Kentucky and Their Potential for Use" (Reference III-1) and "Fresh-Saline Water Interface Map of Kentucky" (Reference III-2). The former map presents information on: the physiographic regions and their subdivisions; use-suitability of land areas; geology; climate; and soils and land use. The latter map presents information on geological structure and interrelationships, geohydrologic controls and their relationship to the fresh-saline groundwater interface; fresh-saline groundwater interface contours; and data on well depths and the quality of well waters.

Data Presentation

The physiographic regions of the Licking River Basin, and the general topographic, drainage, geologic, and groundwater quality characteristics of each region are presented in Exhibit 3.1m. The Licking River Basin is located in the north-central to east-central portions of the state in four distinct physiographic regions. The headwaters of the Licking River (Main Stem) are located in the Eastern Coal Fields Physiographic Region in the Kanawha section of the Appalachian Plateau, an area which is intricately dissected with the tributaries of its streams entrenched in steep, narrow valleys. From its headwaters the Licking River flows through the Knobs and the Bluegrass Physiographic Regions. The Knobs Region is named for its conical and flat-topped hills and forms a narrow crescent encircling the Bluegrass Region on the east, south, and west. The Licking River flows progressively through the Outer Bluegrass, Hills of the Bluegrass, and Inner Bluegrass Subregions of the Bluegrass Region to Covington, where it enters the Ohio River. The Outer Bluegrass has a rolling to undulating terrain which is similar to, but not as developed as that of the Inner Bluegrass. The Hills of the Bluegrass Subregion, which roughly encircles the Inner Bluegrass, separating it from the Outer Bluegrass, is in distinct contrast to both in that the terrain is hilly, with winding ridges and valleys, steep slopes that average 25 to 30 percent, and little level land.

The South Fork Licking River, which enters the Licking River Main Stem, has its headwaters in a portion of the Inner Bluegrass subregion in the Interior Low Plateau into the Hills of the Bluegrass to its confluence with the Main Stem.

Extending through the Bluegrass Region, nearly north to south is the Cincinnati Arch, a formation caused by the broad uplift of the Paleozoic Era. The Arch has influenced greatly the distribution of the rock formations; in the Bluegrass the Arch rose to its greatest height and later erosion of this dome has uncovered formations that are predominantly limestones, with some shales and siltstones. The Knobs Region is comprised of shales, sandstones, and some limestones. In the Eastern Mountains and Coal Field Region, the formations are mostly sandstones, shales, and many seams of high quality coal, only a small portion of which are being mined.

In the northern part of the Inner Bluegrass, the fresh-saline water interface is generally more than 150 feet below the land surface and commonly exceeds 200 feet. In the Outer Bluegrass the interface may be as much as 165 feet below land surface in the valleys, and in the uplands of the Outer Bluegrass and the Knobs, the interface is generally less than 75 feet below land surfaces. The portion of the Eastern Coal Field Region in the Licking River Basin is generally characterized by a fresh-saline water interface of less than 200 feet below land surface.

Topography

Data Source

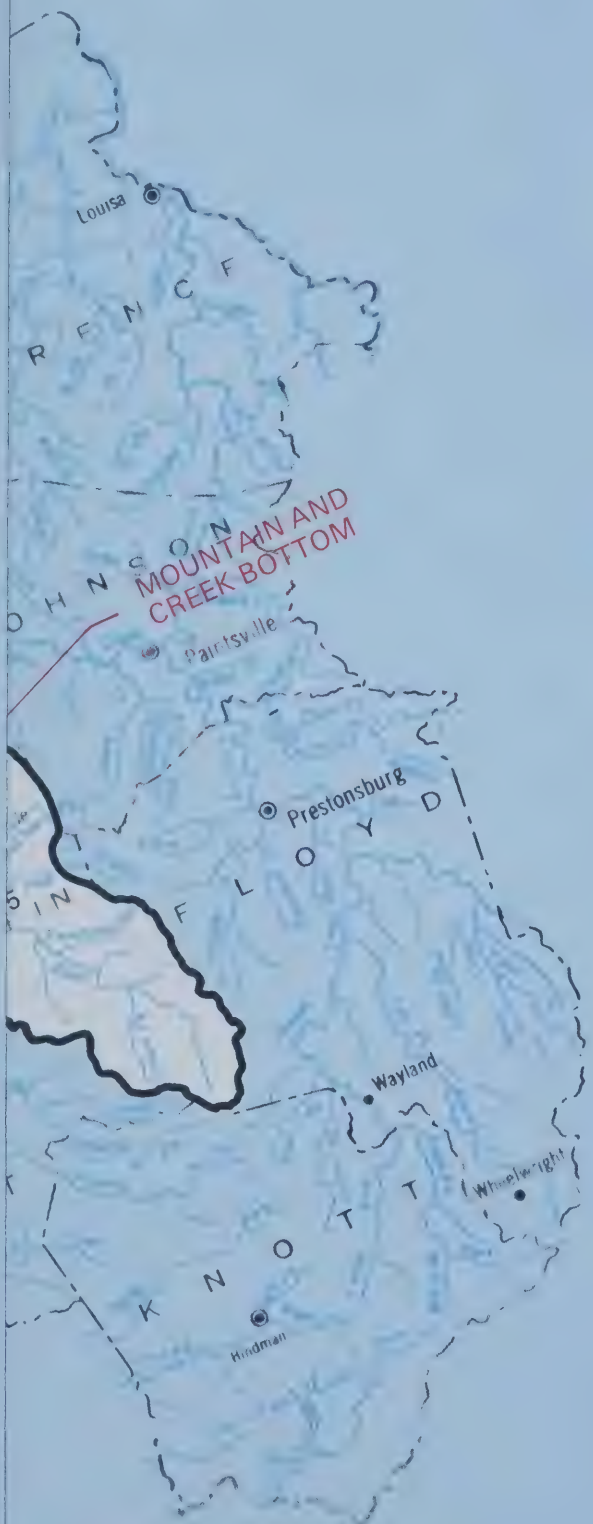
The topography of the Licking River Basin was defined using the 7 1/2-minute topography map series of the United States Geological Survey.

Data Presentation

The topography of the Licking River Basin varies from the highly dissected Appalachian Plateau, the conical hills and broad valleys of the Knobs Region, and the gently rolling terrain of the Outer and Inner Bluegrass, to the hilly terrain and deep stream valleys of the Hills of the Bluegrass. The Licking River (Main Stem) rises from an elevation of 420 feet above mean sea level at its confluence with the Ohio River to an elevation of nearly 1,000 feet at its headwaters. The headwaters of the South Fork Licking River are situated at an elevation in excess of 900 feet. There are no natural lakes in the basin.

	Topography	Drainage: Run-Off	Drainage: Internal	Geology: Formation	Geology: Type	General Groundwater Quality*: Hardness (ppm)	Chloride (ppm)	Sulphate (ppm)
S AND COAL FIELD								
	Mountainous	Rapid	Medium	P	Sa,Sh	25-150	50-150	0.2-380
	Rolling	Med.Rapid	Med.Slow	P	Sa,Sh	25-150	50-150	0.2-380
	Hilly	Very Rapid	Medium	M	Is	125-225	0-10	10-25
	Hilly	Very Rapid	Very Slow	S & D	Sh,Is	250-600	2-75	0.4-100
	Level	Slow	Slow	S & D	Sh,Is			
	Undulating	Med.Rapid	Medium	UO	Is,Sh	250-600	2-75	0.4-100
ss	Hilly	Very Rapid	Slow	UO	Is,Sh	250-600	2-75	150+
	Undulating	Medium	Medium	MO	Is,Sh	250-600	2-75	0.4-100

T. 1966. Fresh saline water interface map of Kentucky. Ky Geological Survey.



LICKING RIVER BASIN

EXHIBIT 3.1m

PHYSIOGRAPHIC REGIONS

LEGEND

x 50 **RIVER MILES**

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PDR

PROCTOR-DAVIS-RAY
Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.

Physiographic Region	Topography	Drainage: Run-Off	Drainage: Internal	Geology: Formation	Geology: Type	General Groundwater Quality*: Hardness (ppm)	Chloride (ppm)	Sulphate (ppm)
EASTERN MOUNTAINS AND COAL FIELD								
Mountain & Creek Bottom Area	Mountainous	Rapid	Medium	P	Sa,Sh	25-150	50-150	0.2-380
Plateau Area	Rolling	Med.Rapid	Med.Slow	P	Sa,Sh	25-150	50-150	0.2-380
Escarpment Area	Hilly	Very Rapid	Medium	M	Ls	125-225	0-10	10-25
KNOBS								
	Hilly	Very Rapid	Very Slow	S & D	Sh,Ls	250-600	2-75	0.4-100
	Level	Slow	Slow	S & D	Sh,ls			
BLUEGRASS								
Outer Bluegrass	Undulating	Med.Rapid	Medium	UO	Ls,Sh	250-600	2-75	0.4-100
Hills of Bluegrass	Hilly	Very Rapid	Slow	UO	Ls,Sh	250-600	2-75	150+
Inner Bluegrass	Undulating	Medium	Medium	MO	Ls,Sh	250-600	2-75	0.4-100

*Hopkins, Herbert T. 1966. Fresh saline water interface map of Kentucky. Ky Geological Survey.

LICKING RIVER BASIN

EXHIBIT 3.1m

PHYSIOGRAPHIC REGIONS

LEGEND

x 50 **RIVER MILES**

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U. S. Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

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As noted earlier in this chapter, the topographic relief of the Licking River Basin has been documented and stored in the digitized terrain model incorporated in ADAPT. The documentation consists of a non-uniform triangular grid, i.e. ADAPT cells, in which the vertices of each triangle in the grid have been defined in terms of x, y, and z coordinates representing longitude, latitude, and elevation respectively. The elements of the prototype topography incorporated into the digitized terrain model include stream system, stream valleys, and drainage area boundaries for all subbasins in the Licking River Basin. For each of the 40 segments defined for the Licking River Basin (Chapter IV), a drainage network has been specified in ADAPT which defines (1) the stream system; and, (2) the land area (i.e., the aggregation of ADAPT cells) tributary to each point in the stream network. The stream system in each drainage network is documented in terms of the River Mile Index System of the State of Kentucky. As presently documented, the digitized terrain model and the drainage networks can be used, in conjunction with demographic data disaggregations for alternative development patterns, sewerage and treatment system planning and costing routines, stream hydrologies, and stream water quality models, in the cost-effective examination of alternative wastewater management systems in future 303(e) Planning cycles.

Soils

Data Sources

The source information used in the development of the soil interpretations for the Licking River Basin was as follows:

1. General soil maps and text interpretations for the Bluegrass, Northern Kentucky, Gateway, Big Sandy, and Buffalo Trace Area Development Districts (ADD's) (Reference III-3 to III-7), each showing the boundaries and providing descriptions of the soil associations in each ADD; from these data sources a total of 37 soil associations, comprised of 96 soil series, were identified in the Licking River Basin.
2. A table entitled "Soil Interpretations for Town and County Planning" (Reference III-8), in which interpretations are presented of the degree and type of limitation for septic tank, sewage lagoons, sanitary landfills and other uses, for each soils series.
3. A table entitled "Hydrologic Soil Groups - Kentucky," in which each soil series is classified in terms of hydrologic soil group on the basis of relative infiltration rate (Reference III-9).
4. A table entitled "Soil Limitations for Accepting Nontoxic Biodegradable Liquid Waste," (Reference III-10), containing interpretations on the degree and type of limitation in each soil series for the land application of wastewaters.

Included in the general soil maps and text interpretations (Item one above) is information on the area, the drainage, permeability and dominant slope characteristics, and the depths to seasonal high water table and to bedrock for each soil series in each association, as well as information on the total area and locational extent of each soil association. The soil interpretations presented in Exhibit 3.2t were developed using information on soil association/soil series, area percent of each soil series in the association, and dominant slope from Item one above. The limitations for septic tank absorption fields were defined from Item two above, hydrologic soil group classifications from Item three above, and the limitations for land application of wastewater from Item four above.

The interpretation entitled "Potential Sediment Runoff" (Exhibit 3.2t) was developed using the following criteria:

Potential Sediment Runoff	Hydrologic Soil Group	Slope
Low	A, B	less than 6%
Medium	C	6 to 20%
High	D	steeper than 20%

In specification of the potential sediment runoff for each soil series, judgment was necessary in those cases wherein a broad range of dominant slopes was indicated for a soil series. A more severe limitation was specified where the slope associated with the hydrologic soil group in the above criteria was less than the dominant slope specified for a soil series.

Data Presentation

The soil interpretations for the Licking River Basin are presented in tabular form in Exhibit 3.2t and in map format in Exhibit 3.3m. Reported in Exhibit 3.2t are: map number (used in identifying the soil associations in Exhibit 3.3m); the percent of association (on an area basis) of each soil series in the association; and the dominant slope, the degree and type of limitation for use as septic tank absorption fields and for the land application of wastewater, the hydrologic soil group, and the sediment runoff potential for each soil series. A map showing the boundaries of each soil association, and the degree of limitation of each soil association for use as septic tank absorption fields, is presented in Exhibit 3.3m. The soil association limitations presented in this figure were defined by determining, from the limitations for each soil series in the association, the degree of limitation applicable to the majority of the area in the association.

The trends defined by the interpretations are as follows:

1. All of the soils series in 27 of the 37 soil associations in the Licking River Basin are severely limited for use as septic tank absorption fields, and a majority if not all of the area in 34 of the soil associations consists of soil series classified as severely limited for septic tank effluent absorption; for this reason, only three of the soil associations in the Licking River Basin are not assigned the severe classification in Exhibit 3.3m.
2. A majority if not all of the area in 19 of the 37 soil associations consists of soils series which are classified as severely limited for the land application of wastewater; most of the soil associations containing soil series classified as slightly or moderately limited for the land application of wastewater are Bourbon, Harrison, Montgomery, and Bath Counties.
3. Twelve of the 96 soil series are classified as

Exhibit 3.2t - Soils Interpretations - Licking River Basin

Map No.	Soil Association	Percent of Association	Dominant Slope %	Septic Tank* Absorption Field (2-6% Slopes) Limitations	Land Application* of Wastewater (2-6% Slopes) Limitations	Hydrologic Soil Group**	Potential Sediment Runoff ***
	STENDAL	42	0-6	Severe (F)	Severe (F)	C	Medium
1	POPE	22	0-6	Severe (F)	Severe (F)	B	Low
	COTACO	17	2-6	Moderate	Severe (F)	C	Medium
2	JEFFERSON	50	30-50	Severe (S)	Slight	B	High
	WHARTON	32	20-50	Severe (P,S)	Severe (P)	C	High
	CAPTINA	19	2-12	Severe (P)	Severe (P)	C	Medium
3	LICKING	19	6-20	Moderate (P)		C	Medium
	ELK	13	2-12	Slight	Slight	B	Low
	NOLIN	13	0-4	Severe (F)	Severe (F)	B	Low
4	NICHOLSON	38	0-8	Severe (P)	Severe (P)	C	Medium
	FAYWOOD	38	6-20	Severe (D,P,S)	Moderate (P)	C	Medium
	EDEN	95	12-30	Severe (P,S)	Moderate (P)	C	High
5	BRASHEAR	1	2-20	Severe (P)	Moderate (P)	C	Medium
	HEITT	1	6-12	Severe (P)		C	Medium
6	ROSSMOYNE	56	0-6	Severe (P)		C	Medium
	JESSUP	31	6-20	Severe (P)		C	Medium
7	BERKS	42	30-50	Severe (D,S)	Moderate	B	High
	CRANSTON	39	25-35	Severe (S)	Slight	B	High
8	JEFFERSON	24	12-20	Severe (S)	Slight	B	Medium
	CRANSTON	28	25-35	Severe (S)	Slight	B	High
9	JEFFERSON	36	12-20	Severe (S)	Slight	B	Medium
	BROOKSIDE	31	12-20	Severe (P,S)	Moderate (P)	C	Medium
	COLYER	30	30-50	Severe (D,S)	Severe	D	High
10	MUSE	27	12-20	Severe (P,S)	Moderate (P)	C	Medium
	TRAPPIST	18	12-20	Severe (D,P)	Moderate (P)	C	Medium
11	WHARTON	48	6-20	Severe (P,S)	Severe (P)	C	Medium
	SHELOCTA	25	12-35	Severe (S)	Slight	B	High
	WHARTON	50	6-12	Severe (P,S)	Severe (P)	C	Medium
12	TILSIT	28	2-6	Severe (P)	Severe (P)	C	Medium
	JOHNSBURG	8	0-4	Severe (F,P)	Severe (P)	D	High
	MONONGAHELA	41	2-6	Severe (P)	Severe (P)	C	Medium
13	ALLEGHENY	30	6-20	Severe (S)	Slight	B	Medium
	TYLER	18	0-2	Severe (P)	Severe (P)	D	High
14	FAIRMOUNT	37	20-35	Severe (D,P,S)	Severe	D	High
	OTWAY	32	12-30	Severe (D,P,S)	Moderate (P)	D	High
15	LOWELL	44	6-12	Severe (P)	Moderate (P)	C	Medium
	SHELBYVILLE	38	2-6	Moderate (P)	Slight	B	Low
	FAYWOOD	35	6-12	Severe (D,P)	Moderate (P)	C	Medium
16	LOWELL	29	6-12	Severe (P)	Moderate (P)	C	Medium
	CULLEOKA	20	20-30	Severe (D,S)	Slight	B	High
	HAGERSTOWN	31	2-12	Moderate (D)	Slight	B	Medium
17	BEDFORD	29	2-6	Severe (P)	Severe (P)	C	Medium
	BEASLEY	20	6-12	Severe (P)	Moderate (P)	C	Medium
	TILSIT	41	2-6	Severe (P)	Severe (P)	C	Medium
18	CLIFTY	21	0-4	Severe (F)	Severe (F)	B	Low
	MOREHEAD	13	0-4	Severe	Slight	C	Medium

Exhibit 3.2t - Soils Interpretations - Licking River Basin

Map No.	Soil Association	Percent of Association	Dominant Slope %	Septic Tank* Absorption Field (2-6% Slopes) Limitations	Land Application* of Wastewater (2-6% Slopes) Limitations	Hydrologic Soil Group**	Potential Sediment Runoff ***
	ATKINS	33	0-4	Severe (F)	Severe (F)	D	High
19	POPE	31	0-4	Severe (F)	Severe (F)	B	Low
	STENDAL	23	0-2	Severe (F)	Severe (F)	C	Medium
	HUNTINGTON	30	0-4	Severe (F)	Severe (F)	B	Low
20	EGAM	24	0-2	Severe (F,P)	Severe (F,P)	C	Medium
	CAPTINA	21	0-2	Severe (P)	Severe (P)	C	Medium
	CUBA	24	0-4	Severe (F)	Severe (F)	B	Low
21	MOREHEAD	19	0-4	Severe	Slight	C	Medium
	TYLER	16	0-4	Severe (P)	Severe (P)	D	High
	MONONGAHELA	32	0-6	Severe (P)	Severe (P)	C	Medium
22	ALLEGHENY	24	2-20	Slight	Slight	B	Medium
	HUNTINGTON	18	0-4	Severe (F)	Severe (F)	B	Low
	EDEN	85	12-30	Severe (P,S)	Moderate (P)	C	High
23	LOWELL	5	2-12	Severe (P)	Moderate (P)	C	Medium
	BRASHEAR	5	2-20	Severe (P)	Moderate (P)	C	Medium
	LOWELL	44	2-12	Severe (P)	Moderate (P)	C	Medium
24	FAYWOOD	29	2-12	Severe (D,P)	Moderate (P)	C	Medium
	SHELBYVILLE	10	2-6	Moderate (P)	Slight	B	Low
25	FAYWOOD	54	12-20	Severe (D,P)	Moderate (P)	C	Medium
	FAIRMOUNT	30	12-30	Severe (D,P,S)	Severe	D	High
	BEASLEY	40	2-12	Severe (P)	Moderate (P)	C	Medium
26	HAGERSTOWN	35	2-12	Moderate (D)	Slight	B	Medium
	MERCER	10	0-6	Severe (P)	Severe (P)	C	Medium
	MONONGAHELA	30	0-6	Severe (P)	Severe (P)	C	Medium
27	ALLEGHENY	27	2-20	Slight	Slight	B	Medium
	OTWAY	25	12-50	Severe (D,P,S)	Moderate (P)	D	High
	WHARTON	30	6-20	Severe (P,S)	Severe (P)	C	Medium
28	TILSIT	25	0-6	Severe (P)	Severe (P)	C	Medium
	JOHNSBURG	20	0-4	Severe (P)	Severe (P)	D	High
	CRANSTON	32	12-30	Severe (S)	Slight	B	High
29	BERKS	25	20-60	Severe (D,S)	Moderate	B	High
	WHARTON	20	6-20	Severe (P,S)	Severe (P)	C	Medium
	COLYER	32	20-60	Severe (D,P)	Severe	D	High
30	TRAPPIST	29	12-20	Severe (D,P)	Moderate (P)	C	Medium
	MUSE	25	6-30	Severe (P)	Moderate (P)	C	High
31	CRANSTON	50	12-30	Severe (D,S)	Slight	B	High
	BERKS	47	20-60	Severe (S)	Moderate	B	High
	LOWELL	40	2-12	Severe (P)	Moderate (P)	C	Medium
32	MERCER	20	0-6	Severe (P)	Severe (P)	C	Medium
	FAYWOOD	10	6-20	Severe (D,P,S)	Moderate (P)	C	Medium
33	MAURY	50	2-12	Slight	Slight	B	Medium
	MC AFEE	30	6-20	Severe (D,P,S)	Moderate (P)	C	Medium
34	LOWELL	35	2-20	Severe (P)	Moderate (P)	C	Medium
	SHELBYVILLE	30	2-12	Moderate (P)	Slight	B	Medium
35	EDEN	91	20-30	Severe (P,S)	Moderate (P)	C	High
	FAYWOOD	26	6-20	Severe (D,P,S)	Moderate (P)	C	Medium
36	LOWELL	25	2-20	Severe (P)	Moderate (P)	C	Medium
	CYNTHIANA	25	12-30	Severe (D,P,S)	Severe	D	High

Exhibit 3.2t - Soils Interpretations - Licking River Basin

Map No.	Soil Association	Percent of Association	Dominant Slope %	Septic Tank* Absorption Field (2-6% Slopes) Limitations	Land Application* of Wastewater (2-6% Slopes) Limitations	Hydrologic Soil Group**	Potential Sediment Runoff ***
37	ASHTON	34	0-6	Slight		B	Low
	HUNTINGTON	30	0-4	Severe (F)	Severe (F)	B	Low
	DEKALB	35	30-70	Severe (DS)	Moderate	B	High
38	WEIKERT	23	50-70	Severe (DS)	Severe	B	High
	SHELOCTA	21	30-70	Severe (S)	Slight	B	High

* Limitations: P = Percolation; S = Slope; D = Shallow Depth; F = Flooding

**

Hydrologic Soil Group	Infiltration Rate
A	High
B	Moderate
C	Slow
D	Very Slow

*** Interpretation for sediment run-off is based on dominant slope and hydrologic soil group only. Rainfall factor, vegetative cover and conservation practices are held constant.

Source: Soil Conservation Service.

MAP NO.	SOIL ASSOCIATION
10	COLYER/MUSE/TRAPPIST
11	WHARTON/SHELOCTA
12	WHARTON/TILSIT/JOHNSBURG
13	MONONGAHELA/ALLEGHENY/TYLER
14	FAIRMOUNT/OTWAY
15	LOWELL/SHELBYVILLE
16	FAYWOOD/LOWELL/CULLEOKA
17	HAGERSTOWN/BEDFORD/BEASLEY
18	TILSIT/CLIFTY/MOREHEAD

LICKING RIVER BASIN

EXHIBIT 3.3m

SOIL INTERPRETATIION

LEGEND

x 50	RIVER MILES
	SEVERE LIMITATION
	MODERATE LIMITATION
	SLIGHT LIMITATION
12	SOIL ASSOCIATION NUMBERS

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

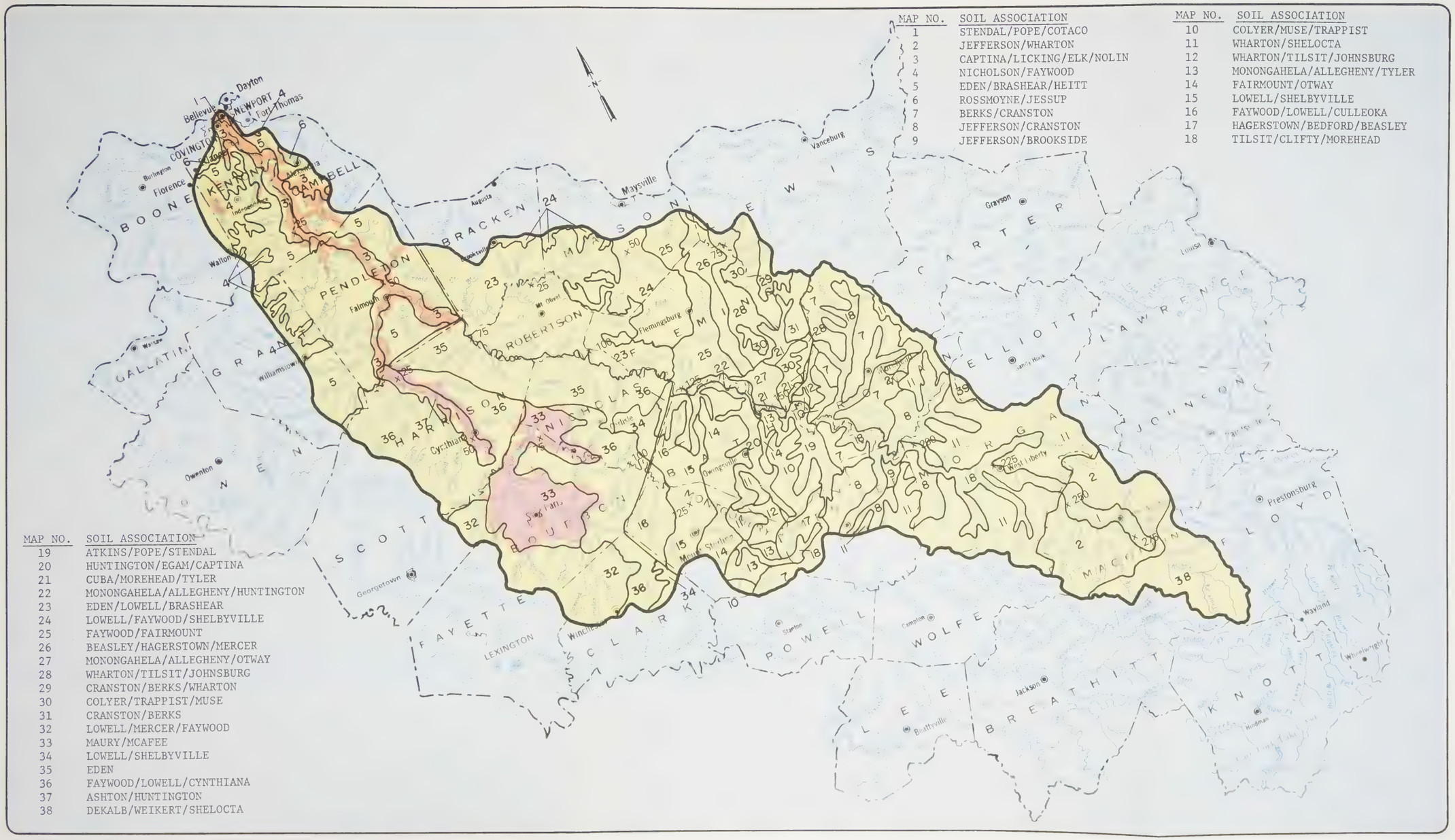
KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PROCTOR-DAVIS-RAY
Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.



MAP NO.	SOIL ASSOCIATION
1	STENDAL/POPE/COTACO
2	JEFFERSON/WHARTON
3	CAPTINA/LICKING/ELK/NOLIN
4	NICHOLSON/FAYWOOD
5	EDEN/BRASHEAR/HEITT
6	ROSSMOYNE/JESSUP
7	BERKS/CRANSTON
8	JEFFERSON/CRANSTON
9	JEFFERSON/BROOKSIDE

MAP NO.	SOIL ASSOCIATION
10	COLYER/MUSE/TRAPPIST
11	WHARTON/SHELOCTA
12	WHARTON/TILSIT/JOHNSBURG
13	MONONGAHELA/ALLEGHENY/TYLER
14	FAIRMOUNT/OTWAY
15	LOWELL/SHELBYVILLE
16	FAYWOOD/LOWELL/CULLEOKA
17	HAGERSTOWN/BEDFORD/BEASLEY
18	TILSIT/CLIFTY/MOREHEAD

MAP NO.	SOIL ASSOCIATION
19	ATKINS/POPE/STENDAL
20	HUNTINGTON/EGAM/CAPTINA
21	CUBA/MOREHEAD/TYLER
22	MONONGAHELA/ALLEGHENY/HUNTINGTON
23	EDEN/LOWELL/BRASHEAR
24	LOWELL/FAYWOOD/SHELBYVILLE
25	FAYWOOD/FAIRMOUNT
26	BEASLEY/HAGERSTOWN/MERCER
27	MONONGAHELA/ALLEGHENY/OTWAY
28	WHARTON/TILSIT/JOHNSBURG
29	CRANSTON/BERKS/WHARTON
30	COLYER/TRAPPIST/MUSE
31	CRANSTON/BERKS
32	LOWELL/MERCER/FAYWOOD
33	MAURY/MCAFEE
34	LOWELL/SHELBYVILLE
35	EDEN
36	FAYWOOD/LOWELL/CYNTHIANA
37	ASHTON/HUNTINGTON
38	DEKALB/WEIKERT/SHELOCTA

LICKING RIVER BASIN

EXHIBIT 3.3m

SOIL INTERPRETATIION

LEGEND

- x 50 — RIVER MILES
- SEVERE LIMITATION
- MODERATE LIMITATION
- SLIGHT LIMITATION
- 12 — SOIL ASSOCIATION NUMBERS

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U. S. Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PROCTOR-DAVIS-RAY
Lexington, Kentucky

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Cincinnati, Ohio Washington D.C.

having a low potential sediment runoff, 57 as medium, and 27 as high.

The general character of the soils of the Licking River Basin is reflected in the agricultural trends of the area. Farming in the Inner Bluegrass is of the intensive-extensive type, largely tobacco and pasture. The value of farm land is high and many of the farms are large. In the Hills of the Bluegrass farm land is the least valuable of the region, with most farms tending toward subsistence and part time farming. Greater emphasis is placed on livestock grazing than on cropping. In the Outer Bluegrass dairying is important, and the production of both dairy and beef cattle is increasing. Farm land in the Knobs Region is relatively low in value, and the proportion of crop and pasture land is also low, with subsistence farming on the increase. Farms in the Eastern Mountains and Coal Fields Region are small and most are subsistence, but part time and residential farms are increasing.

The soils data base stored in ADAPT consists of a listing of the soil association for each of the nearly 5,000 ADAPT cells comprising the basic ADAPT model for the Licking River Basin. This "map" can be used in conjunction with transforms (i.e. computer instructions relating each soil association with one or more of its characteristics, e.g., dominant slope and limitation for use as a septic absorption field) to produce maps showing the spatial variation in a given parameter defining, or defined as a function of, soils type. This listing can be used as is, or expanded to include a listing of each soil series as well as soil association. The types of output mapping that can be developed for use in future planning cycles include: dominant slopes, type as well as degree of limitation for septic tank absorption fields and for land application of wastewaters; and potential sediment runoff. Additionally, as non-point source loading relationships based on modifications to the Universal Soil Loss Equation are developed, the ADAPT data bases on soils and land uses (the latter as discussed below) will provide the basis for developing basinwide predictions of rates of generation of non-point source loadings from agricultural, silvicultural, and other types of land use, at a level of detail appropriate for basin planning.

HYDROLOGY

Surface Water Hydrology

The surface water hydrology is an important determinant in water quality management for the basic reason that the assimilative capacity of the receiving environment is related to the quantity as well as quality of flow in the stream at the point of discharge. Dependent upon the interrelationship between the surface and groundwater hydrologies, the hydrogeologic factors affecting the quality of groundwater, and the nature of man's activities in an area, the quality of the surface water will decrease or shift during low flow periods as: (1) decreasing dilution is available; and/or, (2) the base flow into the stream from the groundwater system becomes a dominant fraction of the total flow in the stream. Both of these circumstances are evident in the Licking River Basin, wherein, under low flow conditions, the total dissolved solids content of the stream flow increases due to increasing percent contribution of groundwater in the stream flow, the sulfate content increases to levels in excess of the bicarbonate content as a result of mining related drainage, and (in the upper basin) the sodium and chloride contents of the water increase in those areas receiving drainage from oil field operations. Thus, the importance of defining the surface water hydrology, at the critical design condition of seven day/10 year recurrent flows (7 day Q_{10}) becomes exceedingly evident in water quality management.

Data Sources

The hydrologic framework used in the development of the maximum daily load parameters and the waste load allocations required in this early stage of the continuous 303(e) Planning cycle for the Licking River Basin was developed by the Universities of Louisville and Kentucky. In this framework process, the basic hydrologic equation by which the design stream flow condition (7-day Q_{10}) at the downstream end of a stream reach was defined was that the design stream flow was taken as equal to the sum of: design stream flow entering the upstream end of the reach (this, in some reaches being equal to the low flow season release rate from an impoundment or impoundments); plus the incremental design stream flows generated from areas tributary to the stream reach; plus the waste discharges to the stream reach.

Three data sources were used to develop the data base for use with this equation: streamflow gaging records of the State of Kentucky, Division of Water Quality and the United States Geological Survey, for determination of 7 day Q_{10} flows; the low flow season release schedule at impoundments; and the schedule of waste discharge flow rates developed for wastewater dischargers in the Licking River Basin in the present study.

The State of Kentucky and the United States Geological Survey cooperate in the operation of a system of primary (gaging and water quality sampling) and secondary (water quality sampling) stations in the Licking River Basin at locations shown in Exhibit 3.4m. The stations designated as primary in Exhibit 3.4m have been operative for in excess of 10 years, and frequency curves have been developed with the 7 day Q_{10} flows (Reference III-11). Secondary gaging stations are also used for occasional discharge measurements of low flows, and statistical methodologies are used to estimate low flow characteristics at those sites without definition of the frequency curve (Reference III-11). Additionally, in the data analysis procedure primary gaging stations having less than 10 years of record are treated as secondary gaging stations.

The primary gaging stations operated in the Licking River Basin are as follows (Exhibit 3.4m): Licking River at Butler; Licking River at West Liberty; South Fork Licking River near Morgan; Strodes Creek, below Hood Creek (near Winchester); North Fork Licking River near Mt. Olivet water plant intake; and North Fork Licking River at its headwaters. The secondary stations operated through Fiscal Year 1975 are: Banklick Creek near its confluence with the Licking River; Licking River at Falmouth; Triplett Creek at Bluestone; Licking River at Farmers (below the dam at Cave Run Reservoir); Licking River

at Salyersville; South Fork Licking River near Grays Run; and Stoner Creek near the Paris water plant intake.

At the present there is one major impoundment on the Licking River (Cave Run Reservoir, located downstream of Salyersville and operated by the Corps of Engineers). The Cave Run Reservoir is designed to augment the low flow of the Licking River by 50 cfs. At the present time the Corps of Engineers is authorized to start design on the Falmouth Reservoir as the second major impoundment in the basin. It is unknown when this reservoir will be operational or what low-flow augmentation will be developed when it becomes operational.

The schedule of waste discharge data used in generating the hydrologic (design flow) data base was developed in the present study, and is presented in Exhibit B-1.4t of Appendix B.

Data Presentation

The hydrologic data base for design flow conditions (7 day Q_{10}) as utilized in this cycle of 303(e) Planning is presented in Exhibit 3.4m. Shown in the overlay of this Exhibit are the stream reaches conveying 7 day Q_{10} flows in ranges of 0.1 to 1.0 cfs, 1 to 10 cfs, and greater than 10 cfs, respectively. By comparison of the stream network shown in Exhibit 3.4m and the stream reaches shown as having design flows in excess of 0.1 cfs in the overlay, it is apparent that there exists many miles of streams tributary to the Main Stem and South Fork of the Licking River Basin which have design flows of less than 0.1 cfs. The impact of this circumstance on water quality management planning is manifested in the requirement, for many of the waste treatment systems in the Basin, that treated effluents be post aerated before discharge to the receiving streams. Because the discharger must bear the added operational cost of post-aeration, it is recommended that the refinement of the surface water hydrologic data base be a priority activity of subsequent 303(e) Planning efforts in the Licking River Basin.

Groundwater Hydrology

The availability of groundwater in the Licking River Basin varies from physiographic region to region (Reference III-11). In the Inner Bluegrass, most wells drilled to limestone rock yield enough water for home use. A few wells in the valleys of major streams yield 50 to 200 gpm (gallons per minute) for public and industrial water supplies. Because saline water may occur at less than 200 feet below land surface, most wells are not this deep. Many springs exist in the Inner Bluegrass, most of which yield only a few gallons per minute.

About half of the wells drilled in the limestone bedrock of the Outer Bluegrass yield enough water for domestic use, and a few wells yield as much as 25 gpm. Shale or shaly limestone formations generally do not yield enough water for home use. Most wells are less than 100 feet in depth below land surface because saline water is encountered below this depth. There are many springs in the Outer Bluegrass, but most go dry in late summer.

In the Knobs Region, bedrock of shale, shaly limestone, and sandstone yields enough water for home or domestic use from less than half the wells drilled. Springs are generally small, and most go dry in late summer.

Bedrock of sandstone, siltstone, and conglomerate in the Eastern Coal Field Region yeild enough water to most wells drilled in valleys for home use. About 50 wells yeild more than 50 gpm for public and industrial water supplies. Some water is obtained from limestone and coal, but little is obtained from shale. Few wells are drilled to more than 200 feet below land surface because of the occurrence of saline water. Numerous small springs are available in the area, but most go dry in late summer.

Because of the seasonal variation in the quantities of groundwater available throughout the Licking River Basin, the groundwater resources of the basin are not relied upon for the majority of the public water supply systems in the Basin (Reference III-11A).

DEMOGRAPHY

For purposes of this report, demographic data includes the general areas of population, housing and employment. The data types were selected as the basic demographic parameters for the initial 303(e) Planning effort, and to provide a skeleton data framework for the continuing planning effort. Future 303(e) Planning efforts should examine in more detail the exact character and extent of the selected and other demographic data base to ascertain the long term optimal data base for the continuing planning process.

Population information is important to the 303(e) Planning process as it relates to waste load generation, wastewater quality, cost allocation, waste load allocation and segment prioritization. Population, in terms of the total number of people, is a rather gross parameter. For water quality management planning, one must be able to locate spatially where people live and work. For example, in determining where a sewer system should be located, the population density, housing data or land use data are the relevant and useful parameters. An assessment of the population density distribution in an area provides the definition of potential sewer service areas which can be converted to total population figures using land use or housing information to develop estimates of waste flows. Also, population density and wastewater generation relationships can be used to modify the general waste flow per capita values that are traditionally used to estimate total wastewater flow (i.e. 100 gallons per person per day).

Housing information and land use information are useful in determining the distribution of population. In the current 303(e) Planning effort, available housing and land use information were acquired. However, only limited land use information pertaining to developed areas was available for much of the basin. In general, pressures for urban land use controls have not been great in Kentucky and there is not much detailed information available. Thus, the data on housing, which is available to a much finer level than the land use data, was of primary value in deciding on population densities.

Population characteristics useful to water quali-

LICKING RIVER BASIN

EXHIBIT 3.4m

STEAM FLOW CHARACTERISTICS

LEGEND

x 50	RIVER MILES
	1-10 cfs
	0.1-1 cfs
	GREATER THAN 10 cfs
	PRIMARY (WATER QUALITY) MONITORING STATIONS
	SECONDARY MONITORING STATIONS

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

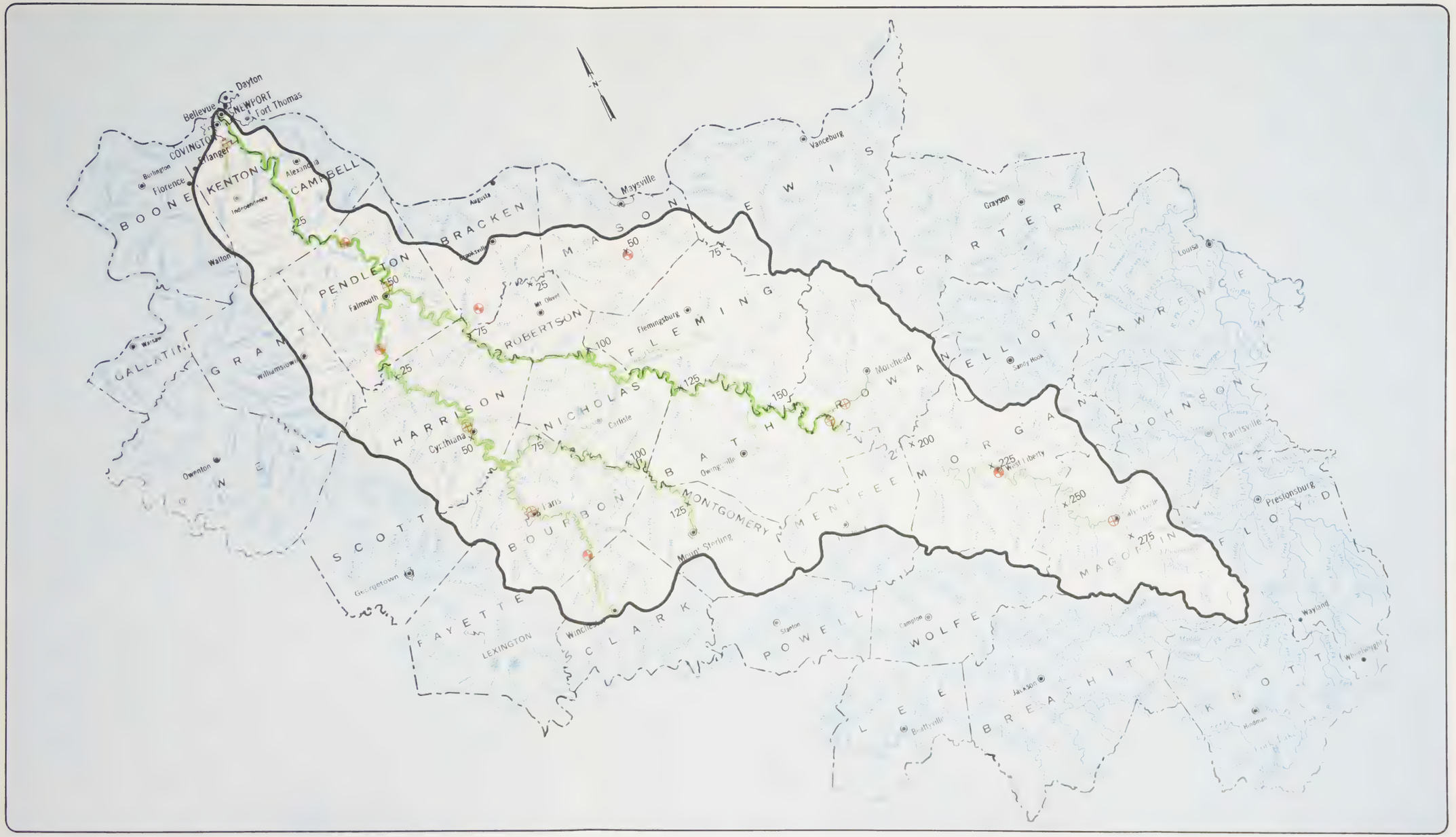
KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PROCTOR-DAVIS-RAY
Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.



LICKING RIVER BASIN

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ty management may extend beyond the total number of inhabitants, their location and the population density. A parameter of possible interest would be the income distribution within an area. For example, the demands placed on governments for service delivery systems will vary with the income of the residents, as will the capacity of the residents to support and pay for such systems. The future analysis of a broader data base might indicate that although the demand for utility service delivery systems, i.e. water, sewer, and waste treatment, is relatively uniform across income levels, these services constitute a larger percentage of government expenditures as the population density of developed areas decreases. Conversely, the demand for social service delivery systems increases as the income level decreases, and these services form a higher percentage of expenditures in areas of higher population density. Thus, the capacity to pay for sewers, treatment plants, etc. can be related to conditions characterized by combinations of a number of parameters.

Because the output of the 303(e) Planning process must address the allocation of both the water resource and the costs incurred in achieving water quality, it is important to be able to develop alternative cost and allocation patterns, and to evaluate the alternatives (at least in part) in terms of the cost/benefit incidence. Total population information at the jurisdictional level does not provide the full capacity to quantify the preceding issues. The continuing planning process should be directed at examining the area of cost/benefit incidence as a function of allocation policies. Although the economic condition of an area is measured to some extent by the income information of its residents, additional information is required for water quality management. As with population information, information on economic activity can be used for waste load calculations, water supply requirements, assessing alternative allocations of the water resource, and the costs of waste collection and treatment.

A number of parameters are available to measure economic activity, among these are: number of establishments; number of employees; amount of sales; salaries; and value added by manufacturing. Additionally, the various sectors of the economy have been classified into groups: i.e. wholesale trade, retail trade, services, construction, manufacturing (by 18 different types), etc. No single parameter or measure of economic activity is most suitable for all analyses related to water quality management. The current 303(e) Planning effort has focused on employment as the parameter to measure economic activity. Although employment data does provide information on the distribution of economic activity for all sectors of the economy, it is of lesser value in assessing the importance or role of each activity in the economy of an area. Future 303(e) Planning efforts may require modification or expansion of the data base to include other parameters, as the need to refine the water quality management decision making process increases.

One of the parameters for consideration in the above refinement effort would be value added by manufacturing. For industrial activity one could relate wastewater loadings to value added projections and develop projected industrial waste quality and quantity. Moreover, the value added relationship provides a much better measure of the relative significance or worth of an industry in an area. An industry may have a very low employment but a very high value added (or vice versa), so that distribution of costs for water quality management on the basis of employment may be very inequitable. Distribution based on value added may be a better alternative and segregation of the value added into that portion made up of taxes and that assignable to raw materials or resource utilization produces another option. Cost allocation alternatives could be based on the character of the value added disaggregation.

The collection of an additional set of information should be considered in the continuing planning process. Data pertaining to basic financial information for each of the cities, counties and wastewater and water districts in the Basin needs to be acquired. It is desirable that data/information relative to bonding capacity, debt service, general expenditures, general revenues and wastewater related revenues; expenditures be available to permit evaluation of alternative cost allocations, in terms of the financial impacts of various water quality management schemes on local governments and authorities. Additionally, it would be useful to correlate the financial information with the economic information to provide further insight into the overt and covert implications of proposed alternative water quality management strategies at both the basin and segment level.

Data Sources - General

A number of documents were reviewed for information relating to population, housing and employment data required for the 303(e) Planning effort. The sources considered included the several Area Development District (ADD) Water and Sewer Plans, State water quality and water resource management reports, local planning commission reports, and publications of numerous local, State and federal agencies (References III-12 to 21). These general reference documents are listed in Appendix D of this report.

Population

Data Sources

Publications of the U. S. Census Bureau were used as the basic reference for historical population data. Census data is available at ten year intervals with the final 1970 census data tabulation completed in 1972. The basic information for the 1970 Census is summarized for the State of Kentucky in Census Publication PC(1)-1419, Number of Inhabitants. Data is summarized by county totals, for all incorporated places within each county and for all incorporated and unincorporated places of 1,000 or more people. Additionally, land area and "urban population" data are provided on a county basis. Urban population in census terminology is any incorporated area having a population greater than 2,500 or any urbanized area within an SMSA. A portion of the Licking Basin is within the Cincinnati SMSA.

In terms of population data, the 1970 U. S. Census data was used as the primary data source. Census data is organized into a fairly complex areal network with significant differences between

organization within SMSA's and outside them. Within SMSA's, data is available in the "HC(3)" series of reports of the Census Bureau (i.e. Block Statistics for Urbanized Areas). These reports contain housing and population data for 1970, organized by blocks (literally a city block) and census tracts, where blocks are a subset of census tracts. Accompanying maps in the HC(3) series show the location of blocks and census tracts within the SMSA. These maps show enumeration districts, which are at a higher level of aggregation than blocks, but lower than census tracts. However, the actual population data is not presented by enumeration district in these reports.

Outside of SMSA's, data is collected and reported on three levels - county, county subdivision, and enumeration district. The enumeration district is the smallest areal subdivision obtainable. Data for enumeration districts is not published but is available on computer tapes. The Kentucky Department of Commerce has these tapes, and provided a printout of population and housing, by enumeration district, for the entire state. This printout included enumeration district data within SMSA's. Maps delineating the location of each enumeration district were also available from the Kentucky Department of Commerce for areas outside the SMSA's.

In terms of census data, the 1970 population data by enumeration district was determined to be the appropriate level for 303(e) Planning using the ADAPT system. The enumeration district was the smallest (and in some cases the only) level of areal aggregation that is readily obtainable, and was the only areal unit which was common to both SMSA's and non-urban areas. The size of enumeration districts in Kentucky varies greatly (from 4 per county to over 100 per county), and is apparently determined by the accessibility of areas to a single enumerator. Thus, in high density urban areas, enumeration districts are small. In medium density suburban areas or counties with good transportation networks, enumeration districts are large. In low density areas with poor transportation, enumeration districts are again small. Thus, the enumeration district category was selected as the common areal unit for population data.

The fact that enumeration district data for Kentucky already exists in a computer file on the State computer was a further advantage in that the data could be directly used to continually update the ADAPT data base on an enumeration district basis, with a minimum of effort.

Unfortunately, current census data collection and presentation networks have only recently been established. Consequently, it must be noted that transference of data between 1950 and 1960, and 1960 and 1970 at any level below the county level is very difficult. Incorporated areas, unincorporated areas and county civil divisions have changed in these periods, so that the totals for each year do not reflect the same area as in preceding or succeeding years. Consequently, inclusion of historical data into ADAPT was not attempted.

For the 303(e) Planning effort, it was necessary to categorize the population data into urban and rural categories, with the rural category further defined by separation in "rural-farm" and "rural-non-farm" populations. Because use of the ADAPT system allowed the land use and population data to be defined at a more refined level, urban population in this report included the population allocated to those ADAPT cells representing small incorporated communities that were discretely defined by one or more enumeration district. Rural population represents those persons resident outside of any incorporated or urbanized area. Recognizing that the rural non-farm population presented in the Census Publication, General Social and Economic Characteristics, included residents of urban areas less than 2,500, these persons were deducted from the total rural, non-farm population before presentation of the final values.

Population projections were available from a number of sources. In many cases the projections conformed to those developed by Spindletop Research for the Kentucky Program Development Office. Although the validity of the Spindletop projections is viewed with concern in some quarters, they were accepted as the baseline projections for this 303(e) Planning effort. In general, the Spindletop projections are just that, a projection of past historical events, with the overall assumption that the same basic forces causing past population change will continue in the future. Thus, the method is in no sense an "alternative futures" approach to population projection.

Where correlations are made, factors are primarily those of closeness to an interstate highway or existing urban area. Although it is not explicitly stated within the Spindletop Projections (the methodology, is, in general, sparsely described), it appears that only the existing urban centers will be maintained and grow. That is, there is no new urban center projected for Kentucky over the next 50 years.

Spindletop projections show a moderate growth for the State as a whole, with strongly increasing urbanization (from 54 percent urbanized in 1975 to 73 percent urbanized in 2020). Counties in the Eastern Coal Field are generally projected to decline in population, primarily through out-migration. Specifically, the projections for the Big Sandy ADD were made assuming that mining employment would not be sufficient to generate population increases or even maintain stability. However, recent data, together with the increased demand for coal, suggest that the population is growing in these counties, and will continue to grow. The impact of energy needs on population growth in the Big Sandy ADD was indicated by the representatives of the Big Sandy Area Development District, who strongly opposed the projections made by Spindletop. Therefore, the population projections developed by the Big Sandy ADD, and presented in the Big Sandy Parks and Recreation Plan were used for those counties located in the Big Sandy ADD.

Data Presentation

Present and projected population data is summarized for the counties within the Licking Basin in Exhibit 3.5t. The assumptions and manipulations performed on the basic data sources to develop information on a basin level (e.g. separating county level data into that portion within the Basin, etc.) and for years for which projected information was required but may not have been available (i.e. 1975, 1980, 1995 conditions) are described in detail in Appendix A-2. More detailed tabular data presenta-

Exhibit 3.5t - Population Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Population				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
LICKING R. B.	277,040	291,586	309,478	378,479	14,546	17,891	69,001	5	6	22
Urban	159,547	173,406	190,027	234,834	13,859	16,621	44,806	8	9	23
Rural	117,494	118,182	119,452	143,649	687	1,270	24,196	0	1	20
-Farm	53,728	54,060	54,596	64,349	332	535	9,753	0	0	17
-Non-farm	63,768	64,123	64,858	79,301	354	735	14,443	0	1	22
BATH CO.										
Out-of-Basin										
In-Basin	9,234	9,514	9,851	11,149	279	336	1,297	3	3	13
Urban	1,762	2,000	2,286	2,578	238	286	292	13	14	12
Rural	7,472	7,514	7,565	8,571	41	51	1,005	0	0	13
-Farm	3,960	3,982	4,009	4,542	22	27	533	0	0	13
-Non-farm	3,512	3,531	3,555	4,028	19	23	472	0	0	13
BOONE CO.										
Out-of-Basin										
In-Basin	4,205	5,338	6,874	13,848	1,132	1,535	6,974	26	28	101
Urban	3,789	4,910	6,441	10,976	1,120	1,531	4,534	29	31	70
Rural	416	428	433	2,872	12	4	2,439	2	1	562
-Farm	128	132	133	887	3	1	753	2	1	562
-Non-farm	287	296	299	1,984	8	3	1,685	2	1	562
BOURBON CO.										
Out-of-Basin										
In-Basin	18,475	19,010	19,831	22,929	535	820	3,098	2	4	15
Urban	9,221	9,683	10,252	11,803	462	569	1,551	5	5	15
Rural	9,254	9,327	9,579	11,126	72	251	1,546	0	2	16
-Farm	4,534	4,570	4,693	5,451	35	123	757	0	2	16
-Non-farm	4,719	4,757	4,885	5,674	37	128	788	0	2	16
BRACKEN CO.										
Out-of-Basin										
In-Basin	2,457	2,485	2,528	2,722	28	42	194	1	1	7
Urban	436	456	487	519	19	31	32	4	6	6
Rural	2,020	2,028	2,040	2,202	8	11	161	0	0	7
-Farm	1,265	1,270	1,277	1,378	5	7	101	0	0	7
-Non-farm	755	758	763	823	2	4	60	0	0	7
CAMPBELL CO.										
Out-of-Basin										
In-Basin	27,734	28,879	29,947	35,005	1,144	1,068	5,057	4	3	16
Urban	22,360	23,311	24,729	30,048	950	1,418	5,318	4	6	21
Rural	5,373	5,567	5,217	4,957	194	-350	-260	3	-6	-4
-Farm	1,268	1,314	1,231	1,169	45	- 82	- 61	3	-6	-4
-Non-farm	4,105	4,253	3,986	3,787	148	-267	-199	3	-6	-4
CLARK CO.										
Out-of-Basin										
In-Basin	13,572	14,689	16,114	21,179	1,116	1,425	5,064	8	9	31
Urban	9,480	10,476	11,716	13,003	995	1,240	1,287	10	11	10
Rural	4,092	4,213	4,398	8,175	120	184	3,777	2	4	85
-Farm	1,632	1,681	1,754	3,262	48	73	1,507	2	4	85
-Non-farm	2,459	2,532	2,643	4,913	72	111	2,270	2	4	85
ELLIOTT CO.										
Out-of-Basin										
In-Basin	365	364	364	363	-1	0	-1	0	0	0
Urban	0	0	0	0	0	0	0	0	0	0
Rural	365	364	364	363	-1	0	-1	0	0	0
-Farm	200	200	200	199	0	0	0	0	0	0
-Non-farm	164	163	163	163	0	0	0	0	0	0
FLEMING CO.										
Out-of-Basin										
In-Basin	11,365	11,327	11,285	11,397	-37	-42	111	0	0	0
Urban	2,512	2,493	2,472	2,521	-18	-21	49	0	0	1
Rural	8,853	8,834	8,813	8,875	-19	-21	62	0	0	0
-Farm	5,285	5,273	5,261	5,298	-11	-12	37	0	0	0
-Non-farm	3,567	3,560	3,551	3,577	- 7	- 8	25	0	0	0

Exhibit 3.5t - Population Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Population				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
GRANT CO.										
Out-of-Basin										
In-Basin	4,586	4,735	4,922	5,681	148	186	758	3	3	15
Urban	1,807	1,935	2,096	2,533	127	161	436	7	8	20
Rural	2,779	2,800	2,826	3,148	21	25	322	0	0	11
-Farm	1,962	1,976	1,995	2,222	14	18	227	0	0	11
-Non-farm	817	823	830	925	6	7	94	0	0	11
HARRISON CO.										
Out-of-Basin										
In-Basin	14,157	14,702	15,429	18,459	544	727	3,030	3	4	19
Urban	6,708	7,320	8,079	9,522	611	758	1,443	9	10	17
Rural	7,449	7,382	7,350	8,936	-66	-31	1,586	0	0	21
-Farm	4,700	4,658	4,638	5,639	-42	-20	1,001	0	0	21
-Non-farm	2,748	2,724	2,712	3,297	-24	-11	585	0	0	21
KENTON CO.										
Out-of-Basin										
In-Basin	94,308	100,658	108,779	138,977	6,349	8,121	30,197	6	8	27
Urban	80,239	87,265	95,225	123,151	7,025	7,960	27,926	8	9	29
Rural	14,069	13,393	13,554	15,829	-676	160	2,274	-4	1	16
-Farm	2,954	2,812	2,846	3,324	-141	33	477	-4	1	16
-Non-farm	11,115	10,580	10,708	12,505	-534	127	1,796	-4	1	16
LEWIS CO.										
Out-of-Basin										
In-Basin	831	829	828	818	-2	0	-10	0	0	0
Urban	0	0	0	0	0	0	0	0	0	0
Rural	831	829	828	818	-2	0	-10	0	0	0
-Farm	676	674	674	665	-1	0	- 8	0	0	0
-Non-farm	154	154	154	152	0	0	- 1	0	0	0
MAGOFFIN CO.										
Out-of-Basin										
In-Basin	9,422	10,112	10,809	12,850	689	697	2,041	7	6	18
Urban	1,269	1,357	1,444	1,690	87	87	245	6	6	16
Rural	8,152	8,755	9,365	11,160	602	609	1,795	7	6	19
-Farm	3,057	3,283	3,512	4,185	226	228	673	7	6	19
-Non-farm	5,095	5,472	5,853	6,975	376	381	1,122	7	6	19
MASON CO.										
Out-of-Basin										
In-Basin	5,945	5,793	5,623	5,080	-151	-169	-543	-2	-2	-9
Urban	323	314	305	276	-8	-9	- 29	-2	-2	-9
Rural	5,622	5,479	5,318	4,804	-143	-160	-513	-2	-2	-9
-Farm	2,457	2,394	2,324	2,099	- 62	- 70	-224	-2	-2	-9
-Non-farm	3,165	3,084	2,994	2,704	- 80	- 90	-289	-2	-2	-9
MENIFEE COUNTY										
Out-of-Basin										
In-Basin	3,439	3,458	3,471	3,525	18	12	54	0	0	1
Urban	480	497	508	519	16	11	10	3	2	2
Rural	2,959	2,961	2,963	3,006	1	1	43	0	0	1
-Farm	1,364	1,365	1,366	1,385	0	0	19	0	0	1
-Non-farm	1,595	1,596	1,597	1,620	1	1	23	0	0	1
MONTGOMERY CO.										
Out-of-Basin										
In-Basin	13,162	14,426	15,896	21,905	1,263	1,470	6,009	9	10	37
Urban	5,114	6,063	7,178	7,537	949	1,114	358	18	18	4
Rural	8,048	8,362	8,717	14,368	314	355	5,650	3	4	64
-Farm	3,259	3,386	3,530	5,819	127	143	2,288	3	4	64
-Non-farm	4,788	4,975	5,187	8,549	187	211	3,361	3	4	64

Exhibit 3.5t - Population Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Population				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
MORGAN CO.										
Out-of-Basin										
In-Basin	8,958	8,809	8,725	8,433	-149	-83	-291	-1	0	-3
Urban	1,387	1,307	1,262	1,142	- 80	-45	-119	-5	-3	-9
Rural	7,571	7,502	7,463	7,291	- 69	-38	-172	0	0	-2
-Farm	3,922	3,886	3,866	3,777	- 35	-20	- 89	0	0	-2
-Non-farm	3,649	3,616	3,597	3,514	- 33	-18	- 82	0	0	-2
NICHOLAS CO.										
Out-of-Basin										
In-Basin	6,507	6,508	6,548	6,892	1	39	343	0	0	5
Urban	1,589	1,590	1,624	1,741	1	33	116	0	2	7
Rural	4,918	4,918	4,924	5,151	0	5	227	0	0	4
-Farm	3,335	3,335	3,339	3,492	0	4	153	0	0	4
-Non-farm	1,583	1,563	1,585	1,658	0	1	73	0	0	4
PENDLETON CO.										
Out-of-Basin										
In-Basin	9,321	9,570	9,883	11,108	249	312	1,225	2	3	12
Urban	3,161	3,347	3,568	3,848	186	221	280	5	6	7
Rural	6,159	6,222	6,314	7,259	62	91	944	1	1	14
-Farm	3,597	3,634	3,687	4,239	36	53	551	1	1	14
-Non-farm	2,562	2,588	2,627	3,020	26	38	393	1	1	14
ROBERTSON CO.										
Out-of-Basin										
In-Basin	2,163	2,111	2,035	2,034	-51	-76	- 1	-2	-3	0
Urban	441	408	370	424	-33	-37	53	-7	-9	14
Rural	1,721	1,702	1,664	1,609	-18	-38	-54	-1	-2	-3
-Farm	1,134	1,121	1,096	1,060	-12	-25	-35	-1	-2	-3
-Non-farm	586	580	567	548	- 6	-12	-18	-1	-2	-3
ROWAN CO.										
Out-of-Basin										
In-Basin	16,748	18,184	19,650	24,038	1,436	1,465	4,388	8	8	22
Urban	7,461	8,667	9,977	10,994	1,206	1,310	1,017	16	15	10
Rural	9,287	9,517	9,673	13,043	229	155	3,370	2	1	34
-Farm	2,999	3,074	3,124	4,213	74	50	1,088	2	1	34
-Non-farm	6,287	6,443	6,548	8,830	155	105	2,281	2	1	34
WOLFE COUNTY										
Out-of-Basin										
In-Basin	76	76	76	77	0	0	0	0	0	0
Urban	0	0	0	0	0	0	0	0	0	0
Rural	76	76	76	77	0	0	0	0	0	0
-Farm	31	31	31	31	0	0	0	0	0	0
-Non-farm	45	45	45	45	0	0	0	0	0	0

tions are also included in this appendix, while the profiles shown in Appendix B provide a graphical display of the several demographic parameters.

Total population in the Licking Basin in 1970 was estimated to be 277,043. Although the population in the Basin is nearly 60 percent urban, the population distribution throughout most of the basin area is characterized by a predominantly rural population dotted with scattered, small urban areas. The major population center is the Northern Kentucky portion of the Cincinnati SMSA, made up of Boone, Campbell and Kenton Counties. The 105,000 people resident in the urbanized portion of these three counties accounted for two thirds of the total urban population in the basin and nearly forty percent of the total basin population in 1970.

The Spindletop population projections can be generally characterized as projecting a continued shift from rural to urban development but without the development of new "urban" centers. The data presented on the Licking Basin reflects this character, as urban population is projected to increase to nearly 235,000 people in 1995. This total represents nearly a 50% increase in urban population in the basin in twenty five years. By 1995, the total population is projected to be 378,485 or a 36 percent increase over the 1970 total. Continuing the trends, the Northern Kentucky area is projected to account for nearly 73 percent of the total urban development.

The headwaters of the Licking Basin lie in the mountainous area of eastern Kentucky that represent the major coal producing area in the State. However, most of the major mining activity is located outside of the Licking Basin (in the Big Sandy and Kentucky River Basins) and the Licking Basin lacks the abundance of small population centers and developed areas that occur along the rivers in the adjacent counties, such as Pike, Floyd, etc. Salyersville, West Liberty and Frenchburg are the small urban areas in this region, with West Liberty being the largest having a population of 1,387 in 1970. Each of these communities are projected to increase in population over the projection period of 1975 - 1995. West Liberty is located near I-64; Frenchburg is located in the Daniel Boone National Forest; and Salyersville is located on the fringe of the major coal producing areas. For these reasons, each of these areas has the potential for increased development.

Morehead, located on Triplett Creek, is the first major municipality along the Licking Basin. The site of Morehead State University, Morehead is located in the Knobs area that forms the transition between the Coal Field Region and the Bluegrass. Morehead State University has and is expected to show considerable growth, that is consistent with the past and projected development for the area. It is estimated that the population in Morehead will double from 7,191 in 1970 to over 14,000 in 1995.

The remaining area of the Licking Basin is located in the Bluegrass Region. This area is dotted with small urban areas, located among the rolling agricultural lands of the Bluegrass. The communities along the North Fork and northern half of the basin tend to be smaller and more stable. These communities include Mt. Olivet, Brooksville, Flemingsburg and Germantown. These areas range in size from 332 in Germantown to 2,483 people in Flemingsburg. These areas are projected to show only slight increases in population over the next twenty years.

The communities lying south of the Licking River near the central Bluegrass Region represent the largest and most rapidly expanding population centers outside the Northern Kentucky area. Winchester, Paris, Cynthiana and Mt. Sterling are the four major areas. Winchester lies on the basin divide and approximately 30 percent of its population was estimated to be in the Kentucky River Basin. These communities varied in 1970 population from 5,083 in Mt. Sterling to 13,402 in Winchester. The areas are all shown to have significant increases in population over the next twenty years. The largest growth has been projected for the Winchester and Mt. Sterling areas, both of which lie along I-64. Additionally, Mt. Sterling has been able to generate a significant industrial base to support such population increases.

Two smaller communities - Carlisle (1579) and Owingsville (1381) - are in the same general region as the above cities. Although these cities are projected to show steady growth patterns over the next twenty years, they are projected to remain as smaller urban areas, largely serving the needs of the associated rural population while developing a moderate industrial base.

The Northern Kentucky counties of Boone, Campbell and Kenton contain the major population centers in the Licking Basin. Covington and Newport are the two major cities in the basin, having populations of 52,535 and 25,998 respectively. Although the trends in these two cities show population to be declining, the contiguous suburban areas have been and are projected to grow significantly. Boone County, currently the least developed but containing the Greater Cincinnati Airport and served by I-275, is projected to incur the greatest growth. Kenton county shows the largest growth numerically, as it is served by both I-71, I-75 and I275. As much of Boone County is in the Ohio River Basin, the growth in Kenton County has the greater impact on population in the Licking Basin.

Grant and Pendleton Counties, although part of the Northern Kentucky ADD, have not yet felt major impacts of growth from the metropolitan Cincinnati area. Williamstown, Dry Ridge, Crittenden, and Corinth are in Grant County, and Butler and Falmouth are in Pendleton County. These areas range in size from 236 people in Corinth to 2,593 in Falmouth. Population is projected to increase in these areas, but at a much slower rate than in the counties in the SMSA.

Housing

Data Sources

Information on the number of housing units was available for each census enumeration district from the printout provided by the Kentucky Department of Commerce. For the SMSA areas, the housing units in each census tract were provided in the HC(3) Block Statistics document (Reference III-22). All of the housing data was obtained from the 1970 census.

Exhibit 3.6t - Housing Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proj. H. Units				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
LICKING RIVER BASIN	93,109	99,511	107,529	138,235	6,402	8,017	30,706	6	8	28
Urban	54,313	59,662	66,249	84,867	5,349	6,586	18,618	9	11	28
Rural	38,797	39,850	41,281	53,370	1,052	1,431	12,088	2	3	29
-Farm	18,292	18,810	19,486	24,724	518	676	5,237	2	3	26
-Non-farm	20,505	21,039	21,794	28,645	534	754	6,851	2	3	31
BATH CO.	3,216	3,410	3,649	4,526	193	239	876	6	7	24
Urban	670	777	912	1,123	106	134	211	15	17	23
Rural	2,546	2,633	2,737	3,402	86	104	664	3	3	24
-Farm	1,349	1,395	1,451	1,803	46	55	352	3	3	24
-Non-farm	1,196	1,237	1,286	1,599	40	49	312	3	3	24
BOONE CO.	1,363	1,750	2,285	4,757	387	534	2,471	28	30	108
Urban	1,233	1,615	2,146	3,785	381	531	1,639	30	32	76
Rural	129	135	138	971	5	3	832	4	2	599
-Farm	40	41	42	300	1	1	257	4	2	599
-Non-farm	89	93	95	671	3	2	575	4	2	599
BOURBON CO.	6,329	6,671	7,150	8,920	341	478	1,750	5	7	24
Urban	3,369	3,612	3,919	4,842	243	306	923	7	8	23
Rural	2,960	3,058	3,230	4,058	97	172	827	3	5	25
-Farm	1,450	1,498	1,583	1,988	47	84	405	3	5	25
-Non-farm	1,510	1,559	1,647	2,069	49	87	422	3	5	25
BRACKEN CO.	917	940	972	1,091	23	31	118	2	3	12
Urban	188	199	215	234	10	15	24	5	8	11
Rural	728	741	756	851	12	15	94	1	2	12
-Farm	456	464	473	533	7	9	59	1	2	12
-Non-farm	272	277	283	318	4	5	35	1	2	12
CAMPBELL CO.	8,503	8,956	9,430	11,412	453	473	1,982	5	5	21
Urban	7,035	7,417	7,968	9,976	381	551	2,008	5	7	25
Rural	1,467	1,539	1,462	1,435	71	-77	-26	4	-5	-1
-Farm	346	363	345	338	16	-18	- 6	4	-5	-1
-Non-farm	1,121	1,176	1,117	1,097	54	-59	-20	4	-5	-1
CLARK	4,704	5,219	5,889	8,249	514	669	2,360	10	12	40
Urban	3,422	3,868	4,440	5,295	445	572	854	13	14	19
Rural	1,282	1,351	1,448	2,953	68	97	1,505	5	7	103
-Farm	511	539	578	1,178	27	38	600	5	7	103
-Non-farm	770	812	870	1,775	41	58	904	5	7	103
ELLIOTT CO.	120	126	133	161	5	7	27	0	0	0
Urban	0	0	0	0	0	0	0	0	0	0
Rural	120	126	133	161	5	7	27	0	0	0
-Farm	66	69	73	88	3	4	15	0	0	0
-Non-farm	54	56	60	72	2	3	12	0	0	0
FLEMING CO.	4,079	4,164	4,264	4,711	84	100	446	2	2	10
Urban	988	1,004	1,024	1,142	16	19	117	1	1	11
Rural	3,091	3,159	3,239	3,569	67	80	329	2	2	10
-Farm	1,845	1,886	1,934	2,130	40	47	196	2	2	10
-Non-farm	1,245	1,273	1,305	1,438	27	32	132	2	2	10
GRANT CO.	1,994	2,103	2,240	2,763	109	137	522	5	6	23
Urban	681	748	834	1,082	67	86	247	9	11	29
Rural	1,313	1,355	1,406	1,680	42	51	274	3	3	19
-Farm	926	956	992	1,186	29	36	193	3	3	19
-Non-farm	386	398	413	494	12	14	80	3	3	19
HARRISON CO.	5,063	5,360	5,750	7,330	296	390	1,580	5	7	27
Urban	2,540	2,810	3,154	3,961	270	343	807	10	12	25
Rural	2,523	2,549	2,596	3,369	26	46	773	1	1	29
-Farm	1,592	1,608	1,638	2,126	16	29	487	1	1	29
-Non-farm	931	940	958	1,243	9	17	285	1	1	29
KENTON CO.	31,677	34,107	37,231	48,816	2,429	3,124	11,585	7	9	31
Urban	27,642	30,210	33,216	43,844	2,568	3,006	10,627	9	9	31
Rural	4,036	3,896	4,014	4,972	-139	117	958	-3	3	23
-Farm	847	818	843	1,044	- 29	24	201	-3	3	23
-Non-farm	3,188	3,078	3,171	3,928	-109	93	757	-3	3	23
LEWIS CO.	259	269	280	315	9	11	34	0	0	0
Urban	0	0	0	0	0	0	0	0	0	0
Rural	259	269	280	315	9	11	34	0	0	0
-Farm	211	219	228	256	7	9	28	0	0	0
-Non-farm	48	50	52	58	1	2	6	0	0	0

Exhibit 3.6t - Housing Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proj. H. Units				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
MAGOFFIN CO.	2,797	3,145	3,548	5,065	347	402	1,517	12	12	42
Urban	443	494	552	769	50	58	216	11	11	39
Rural	2,354	2,651	2,995	4,295	297	344	1,300	12	12	43
-Farm	882	994	1,123	1,610	111	129	487	12	12	43
-Non-farm	1,471	1,657	1,872	2,684	185	215	812	12	12	43
MENIFEE CO.	1,140	1,185	1,236	1,417	45	51	180	3	4	14
Urban	172	184	195	225	11	11	29	6	6	15
Rural	968	1,001	1,041	1,192	33	39	151	3	3	14
-Farm	446	461	479	549	15	18	69	3	3	14
-Non-farm	521	539	561	642	17	21	81	3	3	14
MONTGOMERY CO.	4,552	5,129	5,834	8,575	577	704	2,741	12	13	46
Urban	1,992	2,401	2,905	3,318	409	504	412	20	21	14
Rural	2,560	2,728	2,929	5,257	168	200	2,328	6	7	79
-Farm	1,037	1,105	1,186	2,129	68	81	943	6	7	79
-Non-farm	1,523	1,623	1,742	3,128	100	119	1,385	6	7	79
MORGAN CO.	2,976	3,061	3,195	3,612	85	133	417	2	4	13
Urban	505	498	506	537	-6	8	30	-1	1	5
Rural	2,471	2,563	2,688	3,075	92	124	386	3	4	14
-Farm	1,280	1,328	1,392	1,592	47	64	200	3	4	14
-Non-farm	1,191	1,235	1,295	1,482	44	60	186	3	4	14
NICHOLAS CO.	2,975	3,008	3,063	3,377	32	54	314	1	1	10
Urban	690	698	721	797	7	23	76	1	3	10
Rural	2,285	2,310	2,341	2,580	24	31	238	1	1	10
-Farm	1,549	1,566	1,587	1,749	16	21	161	1	1	10
-Non-farm	735	743	754	830	7	10	76	1	1	10
PENDLETON CO.	3,217	3,366	3,553	4,258	149	186	705	4	5	19
Urban	1,158	1,248	1,357	1,563	89	109	206	7	8	15
Rural	2,059	2,118	2,195	2,694	59	77	498	2	3	22
-Farm	1,202	1,237	1,282	1,573	34	45	291	2	3	22
-Non-farm	856	881	913	1,121	24	32	207	2	3	22
ROBERTSON CO.	829	821	804	850	-8	-16	46	-1	-2	5
Urban	188	177	163	197	-11	-13	33	-6	-7	26
Rural	640	643	640	653	2	- 3	12	0	0	2
-Farm	422	424	422	430	1	- 2	8	0	0	2
-Non-farm	218	219	218	222	0	- 1	4	0	0	2
ROWAN CO.	4,403	4,727	5,028	6,043	324	300	1,015	7	6	20
Urban	1,275	1,580	1,897	2,047	305	316	150	23	20	7
Rural	3,128	3,147	3,131	3,996	18	-15	865	0	0	27
-Farm	1,010	1,016	1,011	1,290	6	- 5	279	0	0	27
-Non-farm	2,117	2,130	2,119	2,705	12	-10	585	0	0	27
WOLFE CO.	22	24	26	31	1	1	5	0	0	0
Urban	0	0	0	0	0	0	0	0	0	0
Rural	22	24	26	31	1	1	5	0	0	0
-Farm	9	10	10	13	0	0	2	0	0	0
-Non-farm	13	14	15	18	0	0	3	0	0	0

Housing projections were available from Kentucky Housing Needs Projections, developed in 1974 by the University of Louisville Urban Studies Center (Reference III-23). The housing needs were based on the existing need to replace substandard housing, an adjustment for vacancies, the needs associated with new population growth, and the need to replace projected housing losses. The output information included projected populations, population per housing unit and the total number of occupied housing units projected for 1975 and 1980 at the county level. Using the projected relationships for population per housing unit, extrapolated to 1995, and the Spindletop Population Projections, 1975, 1980 and 1995 total housing units were estimated for each county. However, the data did not allow resolution of differences that may exist in the basic relationships between urban and rural areas.

Data Presentation

Present and projected data is summarized for the counties within the Licking Basin in Exhibit 3.6t. The assumptions and manipulations performed on the basic data sources to develop information on a basin level (e.g. separating county level data into that portion within the Basin, etc.) and for years for which projected information was required but may not have been available (i.e. 1975, 1980, 1995 conditions) are described in detail in Appendix A-3. More detailed tabular data presentations are also included in this appendix, while the profiles shown in Appendix B provide a graphical display of the several demographic parameters.

Throughout the Licking Basin the trend in population per housing unit within a county is consistently a declining value. The rate of this decline is most significant in the upstream areas of the Basin. Counties such as Magoffin and Knott show reductions in population per unit densities of between 25 and 30 percent. These changes are due in a large part to the relatively stable population projected for these areas, while there is projected to be an increase in available units.

As one proceeds down the Licking to the Cincinnati SMSA area in Northern Kentucky, the change in population per housing unit declines at a slower rate. In the metropolitan area the population per unit is projected to decline by only 5 - 7 percent over the 20 year period. The population per unit density in Boone, Campbell and Kenton Counties is projected to remain between 3.0 to 3.3 people per unit. Thus, housing construction in the SMSA area is projected to be the most siginfncant in the Basin. This projected development is consistent with the population growth projected for the area.

Rowan County is the only area showing a continual increase in population density per housing unit. Morehead State University, located in Rowan County, is the likely reason for this continued increase because of the housing demands of the increasing student population. Such demands may not be met in a manner sufficient to equal the rate of population increase, leading to higher per unit densities.

Employment

Data Sources

Employment data was provided by the Kentucky Department of Commerce for historical and projected conditions (References III-24 to 27). An employment trend was developed for the counties and the ADD's for 1950, 1960, and 1970. The sources used to develop the data were as follows:

- Employment covered by Unemployment Insurance - mining and quarrying; contract construction; manufacturing; and, transportation, communications and utilities workers.
- Decennial census of population-railway workers (which was added to transportation, communications and utilities workers); government.
- Census County Business Patterns - trade; finance, insurance, real estate, and services.

The Department of Commerce data were summarized by county and ADD totals for the above categories, and for 10 categories of manufacturing.

Projections for employment were provided by the Kentucky Department of Commerce for 1980 and 1990 for each of the above categories, but only at the ADD level. These projections were based upon national projections made by the U. S. Department of Labor Statistics and the U. S. Department of Commerce, Bureau of Economic Analysis. Except for mining and quarrying, the ADD level data was generated from Kentucky's share of the national growth using 1960 and 1970 information. Projected employment in mining and quarrying was handled separately under the assumption that the state's growth in mining will be substantial due to the demand for coal. The mining and quarrying employment was distributed largely to the ADD's that had significant coal deposits, but the specific allocation technique was not described.

Data Presentation

Present and projected data is summarized for the counties within the Licking Basin in Exhibit 3.7t. The assumptions and manipulations performed on the basic data sources to develop information on a basin level (e.g. separating county level data into that portion within the Basin, etc.) and for years for which projected information was required but may not have been available (i.e. 1975, 1980, 1995 conditions) are described in detail in Appendices A-4 and A-5. More detailed tabular data presentations are also included in these appendices, while the profiles shown in Appendix B provide a graphical display of the several demographic parameters.

In 1970, total non-agricultural employment in the Licking Basin was estimated as 57,342. Manufacturing, government and wholesale trade represented the three largest employers in the basin, accounting for 26 percent, 24 percent and 22 percent of the total nonagricultural employment. Although the headwaters of the Basin are in the Eastern Coal Field Region, mining activities employ only 531 people or less than one percent of the total nonagriculture employment. The major industrial category is machinery manufacturing, having 6,168 employees in 1970. Although tobacco is a major crop in much of the region, total employment in tobacco related industry was only 99 in 1970. Much of the crop is shipped outside the Basin

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
LICKING R. B.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	57,342	71,084	85,617	108,971	13,741	14,533	23,353	23	20	27
Mining	531	670	812	1,086	139	141	274	26	21	33
Contract Cons.	2,116	2,498	2,920	3,669	382	421	749	18	16	25
Manuf. Total	14,927	19,560	24,581	30,184	4,632	5,020	5,603	31	25	22
-Food & Kind.	763	744	663	584	-19	-80	-79	-2	-10	-11
-Tobacco	99	187	264	359	87	76	95	88	41	35
-Clothing	3,811	4,658	5,389	6,480	846	730	1,091	22	15	20
-Lumber	1,056	1,234	1,466	1,834	177	232	367	16	18	25
-Printing	884	1,259	1,622	2,272	375	362	649	42	28	40
-Chemicals	570	839	1,169	1,548	269	329	379	47	39	32
-Stone	300	374	465	735	73	91	270	24	24	57
-Primary Met.	874	961	1,043	1,202	87	81	159	9	8	15
-Machinery	6,168	8,790	11,844	14,250	2,621	3,054	2,405	42	34	20
-Other Manuf.	398	511	651	916	112	140	264	28	27	40
Transportation	4,186	4,413	4,651	5,031	226	238	379	5	5	8
Wholesale	12,609	14,957	17,379	19,920	2,347	2,422	2,540	18	16	14
Finance	1,824	2,193	2,574	3,526	369	381	951	20	17	36
Services	7,121	9,489	11,893	18,512	2,367	2,404	6,618	33	25	55
Government	14,026	17,300	20,803	27,039	3,274	3,503	6,235	23	20	29
Non-Manuf. Total	42,415	51,523	61,036	78,786	9,108	9,513	17,750	21	18	29
BATH CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	919	1,423	2,014	2,826	503	591	811	54	41	40
Mining	0	3	7	15	3	4	7	0	127	105
Contract Cons.	68	90	117	163	22	27	45	31	29	38
Manuf. Total	12	254	528	822	242	273	294	2,022	107	55
-Food & Kind.	2	2	2	1	0	0	0	0	-6	-28
-Tobacco	0	0	0	1	0	0	1	0	133	157
-Clothing	0	61	118	210	61	56	91	0	91	77
-Lumber	4	9	17	28	4	7	11	92	79	66
-Printing	3	6	9	13	2	3	4	57	50	43
-Chemicals	0	2	6	12	2	3	6	0	128	95
-Stone	0	0	0	0	0	0	0	0	0	0
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	170	373	554	170	202	180	0	118	48
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	77	87	98	114	9	11	15	11	12	16
Wholesale	170	222	284	342	51	62	57	30	28	20
Finance	32	40	50	73	7	9	22	23	23	44
Services	43	76	115	211	32	39	96	72	51	83
Government	512	647	812	1,084	134	164	272	26	25	33
Non-Manuf. Total	907	1,168	1,486	2,003	260	317	517	28	27	34

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
BOONE CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	2,137	2,361	2,640	3,390	223	278	750	10	11	28
Mining	4	4	5	6	0	0	1	8	8	27
Contract Cons.	37	40	43	51	2	2	8	6	7	19
Manuf. Total	651	704	779	897	53	74	118	8	10	15
-Food & Kind	0	0	0	0	0	0	0	0	0	0
-Tobacco	0	1	2	6	1	1	3	0	138	154
-Clothing	3	3	2	2	0	0	0	-18	-23	-17
-Lumber	147	153	160	179	5	7	18	3	5	11
-Printing	90	96	105	137	6	9	31	7	9	29
-Chemicals	56	62	72	89	6	9	17	11	14	24
-Stone	33	35	38	46	2	3	7	6	9	19
-Primary Met.	0	1	3	13	1	1	10	0	137	329
-Machinery	269	300	342	367	30	41	25	11	13	7
-Other Manuf.	49	50	51	56	0	0	4	1	1	9
Transportation	288	288	288	288	0	0	0	0	0	0
Wholesale	555	606	666	771	50	60	105	9	9	15
Finance	28	34	42	71	6	7	29	21	21	69
Services	177	234	302	604	56	68	302	32	29	99
Government	393	447	513	698	54	65	185	13	14	36
Non-Manuf. Total	1,486	1,657	1,861	2,493	170	203	632	11	12	33
BOURBON CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	3,794	4,958	6,058	7,666	1,164	1,100	1,607	30	22	26
Mining	16	19	21	27	2	2	5	18	15	24
Contract Cons.	197	240	281	350	43	41	68	22	17	24
Manuf. Total	1,025	1,408	1,766	2,141	383	357	357	37	25	21
-Food & Kind	19	26	25	22	7	0	-2	37	-1	-11
-Tobacco	25	42	51	61	16	9	9	61	23	17
-Clothing	709	770	817	871	61	46	53	8	6	6
-Lumber	6	8	10	19	2	2	9	33	35	84
-Printing	23	88	135	196	64	47	60	270	53	44
-Chemicals	0	19	39	54	19	20	14	0	106	37
-Stone	6	20	35	87	14	15	51	243	74	144
-Primary Met.	0	18	32	40	18	14	7	0	79	22
-Machinery	235	381	542	653	146	161	110	62	42	20
-Other Manuf.	0	33	73	133	33	40	59	0	122	81
Transportation	144	190	234	296	46	44	62	32	23	26
Wholesale	787	996	1,195	1,375	209	199	179	26	19	15
Finance	118	165	210	314	47	45	103	40	27	49
Services	427	623	808	1,257	195	185	448	45	29	55
Government	1,079	1,314	1,538	1,903	235	223	364	21	17	23
Non-Manuf. Total	2,769	3,549	4,291	5,524	780	742	1,232	28	20	28

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
BRACKEN CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	171	237	302	438	66	64	136	38	27	45
Mining	0	0	0	1	0	0	0	0	121	151
Contract Cons.	3	3	3	3	0	0	0	0	0	0
Manuf. Total	82	124	162	225	41	37	63	50	30	38
-Food & Kind.	4	5	5	5	1	0	0	38	-2	-8
-Tobacco	0	2	3	4	1	1	0	266	90	20
-Clothing	0	26	48	75	26	22	27	0	83	55
-Lumber	0	0	0	1	0	0	1	0	18	127
-Printing	0	0	0	0	0	0	0	15	13	46
-Chemicals	75	78	85	91	3	6	6	5	7	7
-Stone	2	2	2	2	0	0	0	6	5	2
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	7	15	42	7	7	27	0	105	182
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	8	7	7	7	0	0	0	-6	-7	0
Wholesale	25	29	34	41	4	4	6	17	16	18
Finance	5	6	7	10	0	0	2	13	13	39
Services	7	16	26	62	9	9	36	121	59	134
Government	38	48	59	86	10	11	27	26	22	45
Non-Man. Total	89	113	139	213	24	26	73	27	23	52
CAMPBELL CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	4,269	5,302	6,334	7,989	1,032	1,032	1,655	24	19	26
Mining	0	2	4	7	1	1	3	199	64	75
Contract Cons.	194	205	216	235	11	11	18	5	5	8
Manuf. Total	919	1,134	1,375	1,616	214	241	240	23	21	17
-Food & Kind	164	145	119	109	-18	-25	-10	-11	-17	-8
-Tobacco	0	5	10	19	4	5	8	1,710	105	79
-Clothing	136	111	85	70	-25	-25	-14	-18	-23	-17
-Lumber	72	97	128	169	25	30	40	34	31	31
-Printing	39	71	107	176	31	35	69	78	50	64
-Chemicals	6	37	73	112	30	35	39	458	96	54
-Stone	31	42	54	71	10	12	16	32	30	30
-Primary Met.	334	340	347	370	6	7	22	1	2	6
-Machinery	64	211	374	430	147	162	56	228	76	15
-Other Manuf.	68	71	74	84	2	2	10	3	3	14
Transportation	358	358	358	358	0	0	0	0	0	0
Wholesale	1,026	1,267	1,499	1,734	241	232	235	23	18	15
Finance	170	200	228	294	29	28	65	17	14	28
Services	678	951	1,215	1,891	273	263	676	40	27	55
Government	920	1,182	1,435	1,850	261	252	415	28	21	28
Non-Manuf. Total	3,349	4,168	4,958	6,373	818	790	1,414	24	18	28

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
CLARK CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	5,559	6,825	8,085	10,195	1,266	1,260	2,109	22	18	26
Mining	31	35	38	45	3	3	7	10	9	18
Contract Cons.	221	268	315	405	47	47	90	21	17	28
Manuf. Total	2,013	2,430	2,840	3,333	417	410	492	20	16	17
-Food & Kind.	20	28	28	24	7	0	-3	37	-1	-11
-Tobacco	7	25	36	48	17	11	12	228	44	33
-Clothing	281	348	402	473	67	53	70	23	15	17
-Lumber	300	302	305	317	2	3	11	0	1	3
-Printing	34	105	159	239	70	53	79	203	51	50
-Chemicals	111	132	155	175	20	23	19	18	17	12
-Stone	5	21	38	107	15	17	68	284	81	175
-Primary Met.	330	350	367	377	19	16	9	6	4	2
-Machinery	909	1,069	1,253	1,399	159	184	145	17	17	11
-Other Manuf.	10	46	92	171	36	46	78	345	99	84
Transportation	594	645	695	777	50	50	81	8	7	11
Wholesale	918	1,146	1,374	1,610	227	228	235	24	19	17
Finance	150	202	254	389	51	51	135	34	25	53
Services	644	857	1,070	1,658	212	212	588	32	24	54
Government	983	1,239	1,495	1,974	256	256	478	26	20	31
Non-Manuf. Total	3,545	4,394	5,245	6,862	848	850	1,616	23	19	30
ELLIOTT CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	0	0	0	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0	0	0	0
Contract Cons.	0	0	0	0	0	0	0	0	0	0
Manuf. Total	0	0	0	0	0	0	0	0	0	0
-Food & Kind.	0	0	0	0	0	0	0	0	0	0
-Tobacco	0	0	0	0	0	0	0	0	0	0
-Clothing	0	0	0	0	0	0	0	0	0	0
-Lumber	0	0	0	0	0	0	0	0	0	0
-Printing	0	0	0	0	0	0	0	0	0	0
-Chemicals	0	0	0	0	0	0	0	0	0	0
-Stone	0	0	0	0	0	0	0	0	0	0
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	0	0	0	0	0	0	0	0	0
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	0	0	0	0	0	0	0	0	0	0
Wholesale	0	0	0	0	0	0	0	0	0	0
Finance	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0
Non-Manuf. Total	0	0	0	0	0	0	0	0	0	0

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
FLEMING CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	2,239	2,592	2,910	3,464	352	318	553	15	12	19
Mining	74	76	77	81	1	1	3	1	2	4
Contract. Cons.	62	62	62	62	0	0	0	0	0	0
Manuf. Total	754	981	1,172	1,428	226	191	255	29	19	21
-Food & Kind.	17	25	24	22	8	0	-2	50	-2	-8
-Tobacco	0	8	17	20	8	9	3	0	114	18
-Clothing	479	623	734	845	143	111	110	29	17	15
-Lumber	15	18	19	23	3	0	4	25	3	21
-Printing	4	5	5	6	0	0	0	6	5	16
-Chemicals	0	20	51	78	20	31	26	0	149	51
-Stone	0	0	1	1	0	0	0	0	74	28
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	238	277	316	428	39	38	111	16	13	35
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	138	129	119	119	-9	-9	0	-6	-7	0
Wholesale	435	459	484	510	23	24	26	5	5	5
Finance	56	61	65	77	4	4	11	7	7	18
Services	119	169	220	366	49	50	146	41	29	66
Government	594	650	706	817	55	56	110	9	8	15
Non-Manuf. Total	1,484	1,611	1,737	2,035	126	126	298	8	7	17
GRANT CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	748	837	929	1,082	89	91	153	11	10	16
Mining	0	0	0	0	0	0	0	0	100	100
Contract Cons.	25	25	26	28	0	0	1	3	3	6
Manuf. Total	73	94	119	143	21	24	24	29	26	20
-Food & Kind.	0	0	0	0	0	0	0	0	0	0
-Tobacco	0	1	1	2	0	0	0	44	31	42
-Cothing	0	0	0	0	0	0	0	0	0	0
-Lumber	0	2	4	8	2	2	3	0	120	80
-Printing	2	5	8	14	2	3	6	90	55	74
-Chemicals	66	69	72	76	2	3	3	3	4	4
-Stone	2	3	4	5	0	1	1	36	32	35
-Primary Met.	0	0	1	3	0	0	2	0	109	191
-Machinery	0	12	25	31	12	13	5	0	112	19
-Other Manuf.	0	0	0	1	0	0	1	0	125	233
Transportation	74	74	74	74	0	0	0	0	0	0
Wholesale	236	256	275	297	20	19	21	8	7	7
Finance	29	32	34	40	2	2	6	8	7	17
Services	83	105	128	190	22	22	61	27	21	48
Government	226	247	269	307	21	21	38	9	8	14
Non-Manuf. Total	674	742	809	939	67	66	129	10	9	15

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
HARRISON CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	3,541	4,426	5,297	6,705	885	870	1,408	25	19	26
Mining	17	19	21	26	2	2	4	13	11	22
Contract Cons.	51	84	117	177	33	32	60	64	39	51
Manuf. Total	1,466	1,757	2,039	2,356	291	281	317	19	16	15
-Food & Kind.	148	153	150	133	5	-2	-17	3	-1	-11
-Tobacco	11	23	30	39	12	7	8	110	33	26
-Clothing	217	264	301	348	47	37	47	21	14	15
-Lumber	1	2	4	12	1	2	8	149	88	172
-Printing	18	67	104	158	49	37	53	273	55	51
-Chemicals	53	67	83	96	14	16	13	27	23	15
-Stone	6	17	29	75	11	12	46	184	70	157
-Primary Met.	180	193	205	212	13	11	6	7	5	3
-Machinery	644	755	883	981	111	127	98	17	16	11
-Other Manuf.	188	213	245	298	25	32	53	13	15	21
Transportation	115	150	185	240	35	34	55	30	23	29
Wholesale	752	911	1,069	1,228	159	158	159	21	17	14
Finance	158	194	230	321	36	35	91	22	18	39
Services	430	578	725	1,122	148	147	396	34	25	54
Government	552	731	908	1,231	179	177	322	32	24	35
Non-Manuf. Total	2,075	2,669	3,257	4,348	594	588	1,091	28	22	33
KENTON CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	18,619	22,558	26,621	33,669	3,939	4,063	7,047	21	18	26
Mining	4	11	17	31	6	6	13	132	57	76
Contract Cons.	719	761	804	882	42	42	78	5	5	9
Manuf. Total	3,097	4,007	5,066	6,158	909	1,058	1,092	29	26	21
-Food & Kind.	246	217	179	164	-28	-38	-15	-11	-17	-8
-Tobacco	8	26	47	83	18	21	35	219	79	75
-Clothing	92	75	57	47	-17	-17	-10	-18	-23	-17
-Lumber	83	177	293	465	93	116	172	111	65	58
-Printing	585	701	837	1,130	116	136	292	19	19	34
-Chemicals	148	261	398	565	112	136	167	75	52	42
-Stone	70	108	157	228	38	48	70	54	44	44
-Primary Met.	29	52	78	174	22	26	96	79	51	122
-Machinery	1,752	2,296	2,914	3,151	544	617	237	31	26	8
-Other Manuf.	80	90	100	146	9	10	45	11	11	44
Transportation	1,751	1,751	1,751	1,751	0	0	0	0	0	0
Wholesale	5,027	5,919	6,804	7,793	891	884	989	17	14	14
Finance	761	870	979	1,255	109	108	276	14	12	28
Services	3,532	4,542	5,545	8,394	1,010	1,002	2,848	28	22	51
Government	3,725	4,692	5,653	7,401	967	960	1,748	25	20	30
Non-Manuf. Total	15,521	18,550	21,555	27,510	3,028	3,004	5,955	19	16	27

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
LEWIS CO.										
Out-of Basin										
In-Basin										
Total Non-Ag.	0	0	0	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0	0	0	0
Contract Cons.	0	0	0	0	0	0	0	0	0	0
Manuf. Total	0	0	0	0	0	0	0	0	0	0
-Food & Kind.	0	0	0	0	0	0	0	0	0	0
-Tobacco	0	0	0	0	0	0	0	0	0	0
-Clothing	0	0	0	0	0	0	0	0	0	0
-Lumber	0	0	0	0	0	0	0	0	0	0
-Printing	0	0	0	0	0	0	0	0	0	0
-Chemicals	0	0	0	0	0	0	0	0	0	0
-Stone	0	0	0	0	0	0	0	0	0	0
-Primary	0	0	0	0	0	0	0	0	0	0
-Machinery	0	0	0	0	0	0	0	0	0	0
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	0	0	0	0	0	0	0	0	0	0
Wholesale	0	0	0	0	0	0	0	0	0	0
Finance	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0
Non-Manuf. Total	0	0	0	0	0	0	0	0	0	0
MAGOFFIN CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	1,025	1,384	1,724	2,274	358	339	550	34	24	31
Mining	102	195	283	448	93	87	165	91	44	58
Contract Cons.	13	31	49	79	18	17	29	146	55	59
Manuf. Total	36	76	117	153	39	40	36	107	53	30
-Food & Kind.	0	0	1	1	0	0	0	0	37	0
-Tobacco	0	0	0	0	0	0	0	0	0	0
-Clothing	0	11	30	41	11	18	10	0	157	34
-Lumber	36	37	37	32	0	0	-4	1	0	-13
-Printing	0	0	1	2	0	0	1	0	99	119
-Chemicals	0	2	5	9	2	2	4	0	104	86
-Stone	0	1	2	3	1	1	1	0	118	62
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	22	39	62	22	16	23	0	76	58
-Other Manuf.	0	0	0	0	0	0	0	0	100	100
Transportation	71	101	129	168	29	27	38	40	27	30
Wholesale	176	216	255	289	40	38	34	23	17	13
Finance	16	22	28	41	6	5	13	39	26	47
Services	44	95	142	254	50	47	112	111	49	79
Government	564	644	719	839	79	74	120	14	11	16
Non-Manuf. Total	988	1,307	1,607	2,121	319	299	514	32	22	32

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
MASON CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	217	262	303	363	45	40	60	21	15	19
Mining	1	1	1	1	0	0	0	17	16	26
Contract Cons.	4	4	4	4	0	0	0	0	0	0
Manuf. Total	93	122	146	174	28	23	27	30	19	18
-Food & Kind.	5	6	5	5	1	0	0	22	-2	-8
-Tobacco	8	9	11	11	1	1	0	11	11	3
-Clothing	28	47	61	73	18	13	12	63	29	19
-Lumber	0	0	0	1	0	0	0	0	16	80
-Printing	1	1	1	1	0	0	0	3	3	8
-Chemicals	0	3	7	10	2	3	2	410	117	40
-Stone	0	0	1	1	0	0	0	11	8	3
-Primary	0	0	0	0	0	0	0	0	0	0
-Machinery	48	53	58	70	5	4	12	10	9	20
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	9	8	8	8	0	0	0	-6	-7	0
Wholesale	45	49	52	54	3	3	2	6	6	5
Finance	6	7	7	9	0	0	1	7	7	16
Services	30	36	42	58	6	6	15	21	17	37
Government	25	32	39	51	7	7	12	27	21	30
Non-Manuf. Total	123	139	156	188	16	16	32	13	11	20
MENIFEE CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	322	424	535	652	102	110	117	31	25	21
Mining	0	0	1	2	0	0	1	0	114	73
Contract Cons.	2	6	11	18	4	5	6	225	76	57
Manuf. Total	28	77	128	171	49	51	42	177	65	33
-Food & Kind.	0	0	0	0	0	0	0	0	0	0
-Tobacco	0	0	0	0	0	0	0	0	0	200
-Clothing	0	12	23	36	12	10	13	0	84	56
- Lumber	28	28	30	31	0	1	1	3	5	5
-Printing	0	0	1	1	0	0	0	0	119	54
-Chemicals	0	0	1	2	0	0	0	0	99	75
-Stone	0	0	0	0	0	0	0	0	0	0
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	35	72	98	35	37	26	0	107	35
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	3	4	7	9	1	2	2	63	42	31
Wholesale	60	70	82	90	10	11	8	17	16	9
Finance	0	1	3	6	1	1	3	0	112	97
Services	9	15	22	36	6	7	13	73	46	60
Government	220	247	278	317	27	30	39	12	12	14
Non-Manuf. Total	294	347	406	481	53	59	74	18	17	18

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
MONTGOMERY CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	5,068	6,341	7,924	10,468	1,273	1,582	2,543	25	24	32
Mining	11	19	30	55	8	11	24	76	58	81
Contract Cons.	162	218	290	433	56	72	142	34	33	49
Manuf. Total	2,719	3,328	4,054	4,968	609	726	914	22	21	22
-Food & Kind.	50	49	46	32	0	-2	-13	-1	-5	-29
-Tobacco	12	12	13	17	0	1	3	4	10	25
-Clothing	759	916	1,068	1,357	157	152	288	20	16	27
-Lumber	0	11	32	68	11	20	35	0	175	111
-Printing	13	18	27	40	5	8	12	44	46	46
-Chemicals	0	7	16	35	7	9	19	0	135	115
-Stone	46	37	29	27	-8	-8	-1	-18	-22	-5
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	1,839	2,274	2,819	3,389	435	544	569	23	23	20
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	87	110	140	190	23	30	49	26	27	35
Wholesale	958	1,088	1,257	1,438	130	168	180	13	15	14
Finance	127	147	173	244	20	26	70	15	17	40
Services	365	446	552	854	81	105	302	22	23	54
Government	639	982	1,425	2,283	343	442	858	53	45	60
Non-Manuf. Total	2,349	3,013	3,869	5,499	664	856	1,629	28	28	42
MORGAN CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	1,435	1,712	1,993	2,223	276	280	230	19	16	11
Mining	33	35	37	40	1	2	2	5	5	6
Contract Cons.	91	103	116	128	12	12	12	13	12	11
Manuf. Total	293	426	555	639	132	129	83	45	30	14
-Food & Kind.	1	1	0	0	0	0	0	0	-10	-22
-Tobacco	0	0	0	0	0	0	0	0	300	75
-Clothing	189	223	250	276	34	26	26	18	12	10
-Lumber	87	90	94	97	2	3	3	2	3	3
-Printing	10	11	12	14	1	1	1	13	13	9
-Chemicals	0	1	3	5	1	1	1	0	113	56
-Stone	6	4	3	3	-1	-1	0	-18	-22	-5
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	94	190	241	94	96	51	0	101	26
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	87	92	97	101	5	5	4	5	5	4
Wholesale	229	257	287	303	28	29	16	12	11	5
Finance	16	20	24	31	4	4	6	27	22	25
Services	45	63	82	109	17	18	27	38	29	33
Government	638	713	791	869	74	78	77	11	10	9
Non-Manuf. Total	1,141	1,285	1,437	1,584	143	151	147	12	11	10

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
NICHOLAS CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	1,330	1,524	1,700	1,942	193	176	241	14	11	14
Mining	0	0	1	1	0	0	0	0	100	79
Contract Cons.	15	22	28	39	7	6	10	47	30	35
Manuf. Total	648	712	770	826	63	57	56	9	8	7
-Food & Kind.	0	1	1	1	1	0	0	0	0	-16
-Tobacco	0	2	4	5	2	1	1	0	55	33
-Clothing	642	653	660	668	10	7	8	1	1	1
-Lumber	0	0	0	2	0	0	1	0	166	162
-Printing	2	13	21	30	10	7	9	360	54	43
-Chemicals	0	3	6	8	3	3	2	0	100	35
-Stone	0	2	4	12	2	2	7	0	104	159
-Primary Met.	0	2	5	6	2	2	1	0	80	20
-Machinery	2	27	53	69	24	25	16	813	94	31
-Other Manuf.	0	5	12	20	5	6	8	0	118	74
Transportation	4	12	19	29	7	7	9	154	55	46
Wholesale	189	224	256	283	34	31	26	18	14	10
Finance	32	40	48	63	7	7	15	23	17	32
Services	47	80	110	177	32	29	67	67	36	61
Government	390	430	465	520	39	35	54	10	8	11
Non-Manuf. Total	681	811	930	1,115	129	118	184	19	14	19
PENDLETON CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	1,550	1,692	1,833	2,067	141	140	233	9	8	12
Mining	173	174	174	175	0	0	0	0	0	0
Contract Cons.	83	85	87	89	1	1	2	1	1	3
Manuf. Total	283	308	335	366	24	27	31	8	8	9
-Food & Kind.	50	45	37	34	-5	-7	-3	-11	-17	-8
-Tobacco	0	0	1	2	0	0	1	0	114	80
-Clothing	35	29	22	18	-6	-6	-3	-18	-23	-17
-Lumber	23	27	31	37	3	4	5	15	15	18
-Printing	7	12	17	27	4	5	10	56	40	56
-Chemicals	0	4	9	15	4	5	5	0	115	60
-Stone	0	1	3	5	1	1	2	0	120	72
-Primary Met.	0	0	1	5	0	0	3	0	111	173
-Machinery	164	185	209	217	21	23	8	12	12	3
-Other Manuf.	0	0	0	2	0	0	1	0	100	187
Transportation	66	66	66	67	0	0	0	0	0	0
Wholesale	358	393	426	460	34	33	33	9	8	7
Finance	33	38	42	51	4	4	9	12	10	22
Services	79	119	156	254	39	37	97	48	31	61
Government	468	506	542	602	37	36	59	7	7	10
Non-Manuf. Total	1,266	1,384	1,497	1,700	117	113	202	9	8	13

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
ROBERTSON CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	254	310	355	414	56	45	59	22	14	16
Mining	0	0	0	0	0	0	0	0	150	79
Contract Cons.	5	5	5	5	0	0	0	0	0	0
Manuf. Total	0	37	66	94	37	29	27	0	77	40
-Food & Kind.	0	1	1	1	1	0	0	0	0	-7
-Tobacco	0	1	2	3	1	1	0	0	100	10
-Clothing	0	23	40	52	23	16	11	0	70	28
-Lumber	0	0	0	1	0	0	0	0	16	71
-Printing	0	0	0	0	0	0	0	0	0	100
-Chemicals	0	3	8	11	3	4	2	0	134	34
-Stone	0	0	0	0	0	0	0	0	100	49
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	6	12	24	6	5	11	0	89	95
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	58	54	50	50	-3	-4	0	-6	-7	0
Wholesale	13	16	20	23	3	3	2	30	21	13
Finance	6	6	7	8	0	0	1	11	8	17
Services	12	20	27	43	8	7	15	69	37	55
Government	160	169	177	189	9	8	11	5	5	6
Non-Manuf. Total	254	272	289	320	18	16	31	7	6	10
ROWAN CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	4,136	5,906	8,052	11,134	1,769	2,146	3,082	42	36	38
Mining	58	70	86	116	11	15	30	19	21	34
Contract Cons.	159	237	335	508	78	98	172	49	41	51
Manuf. Total	726	1,571	2,554	3,665	844	983	1,111	116	62	43
-Food & Kind.	33	33	31	22	0	-1	-9	-1	-5	-29
-Tobacco	23	24	26	30	0	1	4	3	6	15
-Clothing	235	454	661	1,010	219	207	349	93	45	52
-Lumber	248	264	292	335	16	27	43	6	10	14
-Printing	44	53	65	80	8	11	15	18	22	23
-Chemicals	50	60	74	97	9	13	23	19	21	31
-Stone	89	73	57	53	-16	-16	-3	-18	-22	-5
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	606	1,346	2,035	606	740	688	0	121	51
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	245	277	318	378	32	40	60	13	14	18
Wholesale	641	824	1,052	1,271	182	228	218	28	27	20
Finance	71	100	135	221	28	35	85	38	35	62
Services	340	454	597	963	113	143	365	33	31	61
Government	1,891	2,370	2,971	4,009	478	601	1,037	25	25	34
Non-Manuf. Total	3,410	4,334	5,498	7,468	924	1,163	1,970	27	26	35

Exhibit 3.7t - Employment Trends and Projections, 1970-1995, for the Licking River Basin

Area of Coverage	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
WOLFE CO.										
Out-of-Basin										
In-Basin										
Total Non-Ag.	0	0	0	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0	0	0	0
Contract Cons.	0	0	0	0	0	0	0	0	0	0
Manuf. Total	0	0	0	0	0	0	0	0	0	0
-Food & Kind.	0	0	0	0	0	0	0	0	0	0
-Tobacco	0	0	0	0	0	0	0	0	0	0
-Clothing	0	0	0	0	0	0	0	0	0	0
-Lumber	0	0	0	0	0	0	0	0	0	0
-Printing	0	0	0	0	0	0	0	0	0	0
-Chemicals	0	0	0	0	0	0	0	0	0	0
-Stone	0	0	0	0	0	0	0	0	0	0
-Primary Met.	0	0	0	0	0	0	0	0	0	0
-Machinery	0	0	0	0	0	0	0	0	0	0
-Other Manuf.	0	0	0	0	0	0	0	0	0	0
Transportation	0	0	0	0	0	0	0	0	0	0
Wholesale	0	0	0	0	0	0	0	0	0	0
Finance	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0
Non-Manuf. Total	0	0	0	0	0	0	0	0	0	0

for processing.

A significant growth in non-agricultural employment is forecast for the Licking Basin. The most significant rate of increase was forecast by the Department of Commerce to occur in the period between 1970 and 1980 with a slowing of the rate between 1980 and 1995. This is at variance with the population projections that, for most areas, increase at a faster rate in the period between 1980 and 1995 than the prior intervals.

Similarly, the percentage of total population employed changes from 21 percent in 1970 to 29 percent in 1985. This increase reflects the overall more rapid rate of increase in employment (90 percent) than population (37 percent). This implies that there is projected to be continual shift of population from the rural areas to employment in manufacturing centers. Both the employment and population projections are representative of such a trend.

Total nonagricultural employment in the Licking Basin is projected to total 108,971 employees in 1995. Manufacturing, wholesale trade and government will continue to be the largest employers, but the service sector of the economy shows the most significant increase to nearly 17 percent of the total nonagricultural work froce in 1995. Manufacturing employment is projected to increase at a more rapid rate than the overall nonagricultural category and will represent 28 percent of the total nonagricultural work force in 1995. Significant increases are forecast in the printing, machinery and chemical industries. The latter two categories are significant water using industrial categories, and increases in their activity must be included in water quality management programs in the Basin.

As with the population distribution within the Basin, the employment distribution can be characterized by small employment concentrations located in and around a dispersed set of municipalities fairly uniformly distributed throughout the basin. Although there are some exceptions, manufacturing employment in most of these areas is limited to a few small industries sufficient to employ a number of local residents that do not commute to more major employment centers.

In the headwaters area, government is the major employment category. Magoffin County has the major mining activity in the Basin. Manufacturing activities are largely associated with the lumber and clothing industries. These industries and the manufacture of machinery are anticipated to continue to be significant employers. The projected growth in machinery manufacture is largely associated with the increases projected for the Gateway ADD, which includes Rowan and Menifee Counties in the headwater area.

The Bluegrass Region and its larger more diverse urban areas show a greater distribution on the type of employers. Government and manufacturing are again the largest employers, however, a strong industrial base exists in both Winchester and Mt. Sterling, in Clark and Montgomery Counties respectively. The diversity and stability of such an industrial mix will often yield an increase of employment in the trade, finance and service categories. This certainly exists in a number of cities in this area. While clothing/apparel and primary metals industries form the major industrial groups, chemicals, lumber and primary metals industries form and are projected to grow as important sectors of the local economy. This industrial distribution is reflected in both the projected employment increase in other categories and the projected population increases.

Kenton County at the mouth of the river has the greatest number of employees in the Basin. Boone and Campbell counties - primarily because much of their area lies in adjacent basins, are not nearly as significant employers in the Licking Basin. The employment patterns of these areas reflect an established economic base characteristic of a major urban area. The trend toward the service industry category is characteristic of the aging of an economy that is occurring in Kenton and Campbell Counties. Although manufacturing is projected to increase in all areas, Kenton County shows by far the greatest rate and numerical increase in employment. Machinery manufacture, clothing, printing, chemicals and primary metals are projected to be the major industrial categories. Wholesale and retail trade are projected to continue to be important components of the Boone County economy. With I-71, I-75, I-275 and the Greater Cincinnati Airport located in the County, access to shopping areas and access to warehousing and related activities are consistent with these trends.

LAND USE

The demands for uses of the water resources are related directly to the type and extent of land use existing in the basin. Some uses, such as water supply and wastewater disposal, occur in direct porportion to location, size and density of population, and commercial and industrial activity. The demand for water in the industrial sector is related to the type and extent of cropping practices used, which in turn are defined by the climatologic, topographic, physiographic and other features of the region. Equally direct interrelationships can be defined between water and land resource utilization for any other type of land use.

Because of this interrelationship, an evaluation of land use patterns, particularly when considered in conjunction with population, economics, water demand, wastewater generation, and other measures, can provide insight to the water demand and wastewater generation from all sources which can be expected with different types of land use patterns. That such evaluations shall be a component of future water quality management has been mandated by the enactment of PL 92-500, which requires that nonpoint source pollutant loadings become part of the equation in the waste load allocation process (as discussed in Chapter I). Unfortunately, at the present time, not all of the information is available to deal with the land use wastewater generation transform. That is, while definitions of per capita domestic and municipal wastewater generation are accepted and used in estimating wastewater quantities as a function of population served, the analagous set of relationships does not yet exist for prediction of the generation and delivery of pollutants from nonpoint sources to the receiving stream. As the state of the art evolves in this latter area, one can anticipate that:

. Pollutant loadings from nonpoint sources will significantly reduce the stream carrying capacity

available for assimilation of treated wastewater effluents from point sources.
- Awareness will increase of the differential rates of nonpoint source pollutant generation and delivery between/among different land uses, and the types of economic activities associated with those land uses.
- As a result, the need will exist to be able to evaluate the tradeoffs in pollutant generation/delivery, the costs of attenuating the pollutant generation/delivery, and the resultant economic activity that can be supported, as a function of any given "mix" of land use patterns selected.

In anticipation that the above will become an integral part of future 303(e) Planning cycles, the development and presentation of land use data in the present 303(e) Planning effort was done with the objectives of

- Developing and displaying a land use data base for the Basin that focused heavily on defining the bounds of the urban land use progression over the 1975-1995 planning horizon, and on quantifying the area of lands that have been strip mined or area mined.
- Organizing the land use data as a spatially-arrayed data base in ADAPT, as a basic reservoir of land use information for subsequent 303(e) Planning cycles wherein both point and nonpoint source pollutant loadings will be quantified elements to be dealt with in the waste load allocation process.

Data Sources

The basic categories of land use activity to be documented at the onset of the present 303(e) Planning effort were as follows:

- Water and Sewer Plans prepared by/for the Area Development Districts (References III-28 to III-36), which contain information on existing sewerage system service areas (ESA's) and (in some cases) descriptions of urban land uses.
- Working land use maps showing the location of residential, industrial, agriculture, recreational and other existing land uses, prepared by county for selected counties in the Basin by the U. S. Department of Agriculture, Soil Conservation Service.
- A current map showing lands bench or area mined for coal in Eastern Kentucky, prepared from satellite imagery at a scale of 1: 250,000 and provided by DNR&EP, Office of Planning and Research (Reference III-37).
- U. S. Geological Survey 7 1/2 minute topographic map series with woodland overprint.
- Detailed map of existing land uses in Campbell, Kenton, and Boone Counties, Kentucky, prepared by the Northern Kentucky Area Planning Commission, 1973.

The data sources were reviewed to ascertain the character and Basinwide consistency of the information available in each category and subcategory of land use. From this review it was determined that:

- Existing urban land use could be defined using either the U. S. Geological Survey topographic map series or the ADD water and sewer plan (with exception of Kenton and Campbell Counties wherein detailed land use information was available).
- The U. S. Geological Survey topographic map series with woodland overprints provided a consistent data base for defining cleared areas and water surfaces.
- No definitive data base existed for construction related land uses.
- No definitive data base existed for mining related land use other than for coal mined areas.

Given the status of available information, the course of action selected for documentation of the land use data base was as follows:

- Existing urban land use was referenced to the year 1970 and was defined using the sources listed above.
- Future land use was not defined consistently on a Basinwide basis, necessitating as an approximation that:
  - 1975-1980 land use be defined as equivalent to 1970 (existing) urban land use (as above defined) plus the remaining areas of each ESA and/or urban Enumeration Districts not included as 1970 existing urban land use; and,
  - 1995 urban land use be defined as equivalent to 1975-1980 urban land use and the remaining areas of each Intensive 201 Planning Area not included as 1975-1980 urban land use (the areal extent of each Intensive 201 Planning Area as defined by DNR&EP).
- Rural land use was defined as the difference between total land area and urban land use at any specified time horizon, and the subcategories of rural land use were defined as follows:
  - "Water," as water surfaces shown in the U. S. Geological Survey topographic map series (inclusive of major reservoirs currently in operation).
  - Mining, as the area of land that was defined as strip mined or area mined for coal extraction in the DNR&EP map (Reference III-37).
  - Silviculture, as the difference between the total area and the sum of water, surface and cleared areas, or the sum of water surface and mined areas (whichever sum was greater), where cleared area was determined from the U. S. Geological Survey topographic map series as above defined.
  - Agriculture, as the area not classified as water, mining, or silviculture.

The detailed procedures by which the land use data base was developed, disaggregated, and stored in the ADAPT system are described in Appendix A-6, and the land use data base is presented below.

Data Presentation

The land use data base is summarized in tabular format in Exhibit 3.8t. The area (in units of square miles assigned to each land use category or subcategory) is presented for each county and basin wide for 1970, 1975, 1980 and 1995, and between year changes are shown for 1975-1970, 1980-1975, and 1995-1980 on a square mile and percentage basis for each county and the entire Basin. The spatial distribution of the land use data base is illustrated in Exhibit 3.9m, wherein overlays are presented showing: 1970 and 1975-1980 urban land use; the location of existing sewerage system service areas (ESA's) and Intensive 201 Planning Areas with respect to urban land use in 1970 and

EXHIBIT 3.8T LAND USE TRENDS AND PROJECTIONS, 1970-1995, FOR THE LICKING RIVER BASIN

AREA OF COVERAGE	AT YEAR ACTUAL OR PROPOSED LAND USE				BETWEEN YEAR CHANGES			BETWEEN YEAR PERCENT CHANGES		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
STATE OF KENTUCKY										
LICKING RIVER BASIN										
TOTAL										
URBAN										
RURAL										
AGRIC										
SILVIC										
MINING										
WATER										
BATH COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	280	280	280	280	0	0	0	0	0	0
URBAN	4	4	4	16	0	0	12	0	0	278
RURAL	276	276	276	264	0	0	-11	0	0	-3
AGRIC	176	176	176	167	0	0	-7	0	0	-4
SILVIC	94	94	94	91	0	0	-3	0	0	-3
MINING	0	0	0	0	0	0	0	0	0	-99
WATER	6	6	6	6	0	0	0	0	0	0
BOONE COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	6	6	6	6	0	0	0	0	0	0
URBAN	1	1	1	2	0	0	1	0	0	55
RURAL	5	5	5	4	0	0	0	-17	0	-14
AGRIC	5	5	5	4	0	0	0	-18	0	-14
SILVIC	0	0	0	0	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
BOURBON COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	289	289	289	289	0	0	0	0	0	0
URBAN	9	13	13	16	3	0	4	33	0	29
RURAL	279	276	276	272	-2	0	-3	0	0	0
AGRIC	268	265	265	261	-2	0	-3	0	0	0
SILVIC	12	11	11	11	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0

AREA OF COVERAGE	AT YEAR ACTUAL OR PROPOSED LAND USE				BETWEEN YEAR CHANGES			BETWEEN YEAR PERCENT CHANGES		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
BRACKEN COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	86	86	86	86	0	0	0	0	0	0
URBAN	0	1	1	2	0	0	2	30	0	333
RURAL	85	85	85	84	0	0	-1	0	0	-1
AGRIC	66	66	66	64	0	0	-1	0	0	-1
SILVIC	19	19	19	19	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
CAMPBELL COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	64	64	64	64	0	0	0	0	0	0
URBAN	11	14	14	14	3	0	0	0	0	0
RURAL	53	50	50	50	-3	0	0	-6	0	0
AGRIC	38	37	37	37	-1	0	0	-3	0	0
SILVIC	15	13	13	13	-2	0	0	-13	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
CLARK COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	99	99	99	99	0	0	0	0	0	0
URBAN	5	5	5	17	0	0	12	4	0	247
RURAL	94	94	94	83	0	0	-11	0	0	-11
AGRIC	92	92	92	81	0	0	-11	0	0	-12
SILVIC	2	2	2	2	0	0	0	0	0	-4
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
ELLIOTT COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	10	10	10	10	0	0	0	0	0	0
URBAN	0	0	0	0	0	0	0	0	0	0
RURAL	10	10	10	10	0	0	0	0	0	0
AGRIC	2	2	2	2	0	0	0	0	0	0
SILVIC	8	8	8	8	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0

AREA OF COVERAGE	AT YEAR ACTUAL OR PROPOSED LAND USE				BETWEEN YEAR CHANGES			BETWEEN YEAR PERCENT CHANGES		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
FLEMING COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	356	356	356	356	0	0	0	0	0	0
URBAN	2	2	2	4	0	0	2	17	0	72
RURAL	354	353	353	352	0	0	-1	0	0	0
AGRIC	252	252	252	250	0	0	-1	0	0	0
SILVIC	101	101	101	101	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
GRANT COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	88	88	88	88	0	0	0	0	0	0
URBAN	3	4	4	6	1	0	2	58	0	46
RURAL	86	84	84	82	0	0	-1	-1	0	-1
AGRIC	62	60	60	58	0	0	-1	-1	0	-2
SILVIC	24	24	24	24	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
HARRISON COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	313	313	313	313	0	0	0	0	0	0
URBAN	4	5	5	10	1	0	5	30	0	94
RURAL	309	307	307	302	0	0	-4	0	0	-1
AGRIC	256	249	249	244	0	0	-4	0	0	-1
SILVIC	58	58	58	58	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
KENTON COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	142	142	142	142	0	0	0	0	0	0
URBAN	30	43	43	45	13	0	2	43	0	5
RURAL	11	99	99	97	-3	0	-2	-11	0	-2
AGRIC	74	70	70	68	-4	0	-2	-5	0	-3
SILVIC	38	29	29	29	-9	0	0	-24	0	-2
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0

Area Of Coverage	At Year Actual Or Proposed Land Use				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
MONTGOMERY COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	174	174	174	174	0	0	0	0	0	0
URBAN	1	2	2	31	2	0	29	200	0	1450
RURAL	174	172	172	144	-1	0	-27	0	0	-16
AGRIC	139	137	137	110	-1	0	-26	0	0	-19
SILVIC	35	35	35	34	0	0	0	0	0	-2
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
MORGAN COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	341	341	341	341	0	0	0	0	0	0
URBAN	1	3	3	5	2	0	2	200	0	67
RURAL	340	338	338	336	-1	0	-1	0	0	0
AGRIC	97	96	96	95	0	0	0	0	0	0
SILVIC	242	241	241	240	0	0	0	0	0	0
MINING	1	1	1	1	0	0	0	-2	0	0
WATER	0	0	0	0	0	0	0	0	0	0
NICHOLAS COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	195	195	195	195	0	0	0	0	0	0
URBAN	1	2	2	3	1	0	1	100	0	50
RURAL	194	193	193	191	0	0	0	0	0	0
AGRIC	156	157	157	156	0	0	0	0	0	0
SILVIC	36	36	36	36	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
PENDLETON COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	261	261	261	261	0	0	0	0	0	0
URBAN	1	1	1	4	0	0	3	3	0	100
RURAL	259	259	259	257	0	0	-1	0	0	0
AGRIC	176	176	176	174	0	0	-1	0	0	0
SILVIC	83	83	83	83	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0

AREA OF COVERAGE	AT YEAR ACTUAL OR PROPOSED LAND USE				BETWEEN YEAR CHANGES			BETWEEN YEAR PERCENT CHANGES		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
LEWIS COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	32	32	32	32	0	0	0	0	0	0
URBAN	0	0	0	0	0	0	0	0	0	0
RURAL	32	32	32	32	0	0	0	0	0	0
AGRIC	22	22	22	22	0	0	0	0	0	0
SILVIC	10	10	10	10	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
MAGOFFIN COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	283	283	283	283	0	0	0	0	0	0
URBAN	2	4	4	4	3	0	0	163	0	7
RURAL	282	279	279	279	-2	0	0	0	0	0
AGRIC	46	47	47	46	0	0	0	-1	0	0
SILVIC	226	227	227	227	0	0	0	0	0	0
MINING	6	6	6	6	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
MASON COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	160	160	160	160	0	0	0	0	0	0
URBAN	1	1	1	1	0	0	0	9	0	0
RURAL	158	158	158	158	0	0	0	0	0	0
AGRIC	148	148	148	148	0	0	0	0	0	0
SILVIC	11	11	11	11	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
MENIFEE COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	134	134	134	134	0	0	0	0	0	0
URBAN	1	1	1	4	0	0	3	38	0	328
RURAL	133	133	133	130	0	0	-2	0	0	-1
AGRIC	28	28	28	28	0	0	0	0	0	-1
SILVIC	102	102	102	99	0	0	-1	0	0	-1
MINING	0	0	0	0	0	0	0	0	0	0
WATER	3	3	3	3	0	0	0	0	0	0

AREA OF COVERAGE	AT YEAR ACTUAL OR PROPOSED LAND USE				BETWEEN YEAR CHANGES			BETWEEN YEAR PERCENT CHANGES		
	1970	1975	1980	1995	1975-1970	1980-1975	1995-1980	1975-1970	1980-1975	1995-1980
ROBERTSON COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	99	99	99	99	0	0	0	0	0	0
URBAN	0	1	1	1	0	0	0	83	0	45
RURAL	99	98	98	98	0	0	0	0	0	0
AGRIC	76	75	75	75	0	0	0	0	0	0
SILVIC	23	23	23	23	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
ROWAN COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	274	274	274	274	0	0	0	0	0	0
URBAN	6	6	6	28	0	0	22	3	0	352
RURAL	268	268	268	246	0	0	-21	0	0	-7
AGRIC	65	65	65	56	0	0	-8	0	0	-13
SILVIC	200	199	199	187	0	0	-12	0	0	-5
MINING	1	1	1	1	0	0	0	0	0	0
WATER	3	3	3	3	0	0	0	0	0	0
WOLFE COUNTY										
OUT OF BASIN										
IN-BASIN										
TOTAL	3	3	3	3	0	0	0	0	0	0
URBAN	0	0	0	0	0	0	0	0	0	0
RURAL	3	3	3	3	0	0	0	0	0	0
AGRIC	1	1	1	1	0	0	0	0	0	0
SILVIC	2	2	2	2	0	0	0	0	0	0
MINING	0	0	0	0	0	0	0	0	0	0
WATER	0	0	0	0	0	0	0	0	0	0
LICKING RIVER BASIN										
TOTAL	3688	3688	3688	3688	0	0	0	0	0	0
URBAN	84	114	114	214	30	0	100	36	0	88
RURAL	3604	3574	3574	3474	-30	0	-100	-1	0	-3
AGRIC	2240	2224	2224	2147	-16	0	-77	-1	0	-3
SILVIC	1345	1331	1331	1309	-13	0	-22	0	0	-1
MINING	7	7	7	7	0	0	0	0	0	0
WATER	12	12	12	12	0	0	0	0	0	0

1975-1980; and the mining, silviculture, and agriculture related composition of rural land use. The overlays where developed by a Cal Comp plotter using the land use data base stored in ADAPT.

The total land area of the Licking River Basin is approximately 3,700 square miles, and existing urban land use is projected to increase from 84 square miles (2.3 percent of the Basin area) to 114 square miles (3.1 percent) by 1980 and to 214 square miles (5.8 percent) by 1995. Half of the existing urban land use in the Basin is located in Kenton and Campbell Counties in Northern Kentucky, and an additional 30 percent is distributed among Bourbon, Rowan, Bath, Grant and Harrison Counties. As of the 1995 time horizon (at which time it was assumed that all of the areas of each Intensive 201 Planning Area will have been urbanized), the Northern Kentucky counties will account for about 30 percent of the 214 square miles of projected urban land use in the Basin. Montgomery, Bath and Clark Counties will account for an additional 30 percent of the Basin total in 1995, as compared with about 12 percent in 1970, the increases from 1970 to 1995 in these counties reflecting the incorporation of each Intensive 201 Palnning Area as urbanized 1995 land use. The only counties in the Licking River Basin projected to continue to have no urban land use in 1995 are Elliott, Lewis, and Wolfe Counties. In general, the projected expansion of urban land use in the Licking River Basin follows the trends for population, housing, and employment described earlier in this Chapter, with the exception that the inclusion of the Intensive 201 Planning Areas in 1995 urban land use somewhat exaggerates the 1995 urban land use projections in several counties. It is suggested that further detailed evaluations be done of projected urban land use in subsequent 303(e) Planning.

The overlays of Exhibit 3.9m provide a graphic illustration of the character and intensity of existing and projected urban land use and of the coal mining, silvicultural, and agricultural land use in the Licking River Basin. The land areas that have been bench or area mined for coal extraction comprise a total of seven square miles, or less than two percent of the total area of the Basin; of this total, six square miles of coal mined area are located in Magoffin County and one square mile in Morgan County. That these areas represent but a miniscule fraction of the total area containing coal deposits in the Licking River Basin is evident from inspection of the mineral resources map of Exhibit 3.10m, which indicates that coal deposits are located throughout Magoffin and Morgan Counties and a portion of Menifee County in the Basin. It is also evident from the overlays of Exhibit 3.9m that much of the headwaters area of the Basin containing coal deposits is presently silvicultural in character, containing from 75 to 100 percent silvicultural. Thus to a great extent, the land mass which presently has not been utilized for the extraction of coal resources remains in a basically undisturbed silvicultural state.

In summary, the land use data base for the Licking River Basin indicates that urbanization in the Basin will continue at a rapid pace, with a resultant increase in the water pollution related stress on the resident aquatic ecosystem and on social expectations for a high quality water resource. It is also probable that increasing national demands for coal will result in considerable changes in the character of water quality and water resources problems in the upper portion of the Licking River Basin.

EXISTING WATER QUALITY STANDARDS

The Commonwealth of Kentucky has four documents which define water quality requirements for all waters in the Commonwealth:

1. WP-4-1, Water Quality Standards for Waters of the Commonwealth of Kentucky, adopted on July 23, 1971 and amended by the U.S. Environmental Protection Agency on November 25, 1974.

2. Antidegradation Statement, March 5, 1971.

3. WP-6-2, Use Classification of Waters, Treatment Requirements and Compliance, adopted on November 5, 1973, and amended by the U.S. Environmental Protection Agency on November 25, 1974

4. Policy for Addition of Streams Not Shown on the map, "Streams of Kentucky," February 6, 1974.

The six sections of the Water Quality Standards for Waters of the Commonwealth of Kentucky (WP-4-1) set minimum conditions applicable to "all waters of the Commonwealth of Kentucky." This document defines the following five stream use classifications:

1. Public Water Supply and Food Processing Industries.
2. Industrial Water Supply.
3. Aquatic Life.
4. Recreation.
5. Agriculture.

Water quality parameter limitations for each stream use classification are also established in WP-4-1; and this regulation further states that in any water having more than one use classification, the more stringent use criteria applies. Section 6 was recently added to WP-4-1 by the U.S. Environmental Protection Agency and provides for exceptions to stream segment classifications and/or criteria based upon adequate demonstration that water quality levels necessary for aquatic life or secondary contact recreation are not attainable. Such exceptions are temporary in nature and must be reviewed at least every three years.

The Antidegradation Statement basically holds that all waters whose quality exceeded the criteria outlined in WP-4-1 on the date this regulation became effective would be maintained at this high quality level, unless it was demonstrated that a lowering in those water's quality was justifiable.

WP-6-2, which was adopted by the Department for Natural Resources and Environmental Protection on November 5, 1973, addresses use classifications of waters, treatment requirements, and compliance scheduling. Basically, this document classifies all waters shown on the map, "Streams of Kentucky," prepared by the Kentucky Department of Commerce, for all uses as outlined in Sections 3 and 4 of WP-4-1. The U.S. Environmental Protection Agency recently amended Section 1(2) of this regulation so that all waters not shown on the map, "Streams of Kentucky," must meet aquatic life and secondary contact recreation criteria. WP-6-2 further states that point source dischargers must implement best practicable control technology by 1 July, 1977 and the best available technology economically achievable by July 1, 1983. Existing dis-

LICKING RIVER BASIN

EXHIBIT 3.9m-1

LAND USE

THIS EXHIBIT SHOWS LAND USE WITH AGRICULTURE MINING RELATED URBAN

LEGEND

x 50 RIVER MILES

AGRICULTURE

- 1-25%
- 26-50%
- 51-75%
- 76-100%

URBAN

MINING

- 1-25%
- 26-50%
- 51-75%
- 76-100%

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PDR

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Lexington, Kentucky

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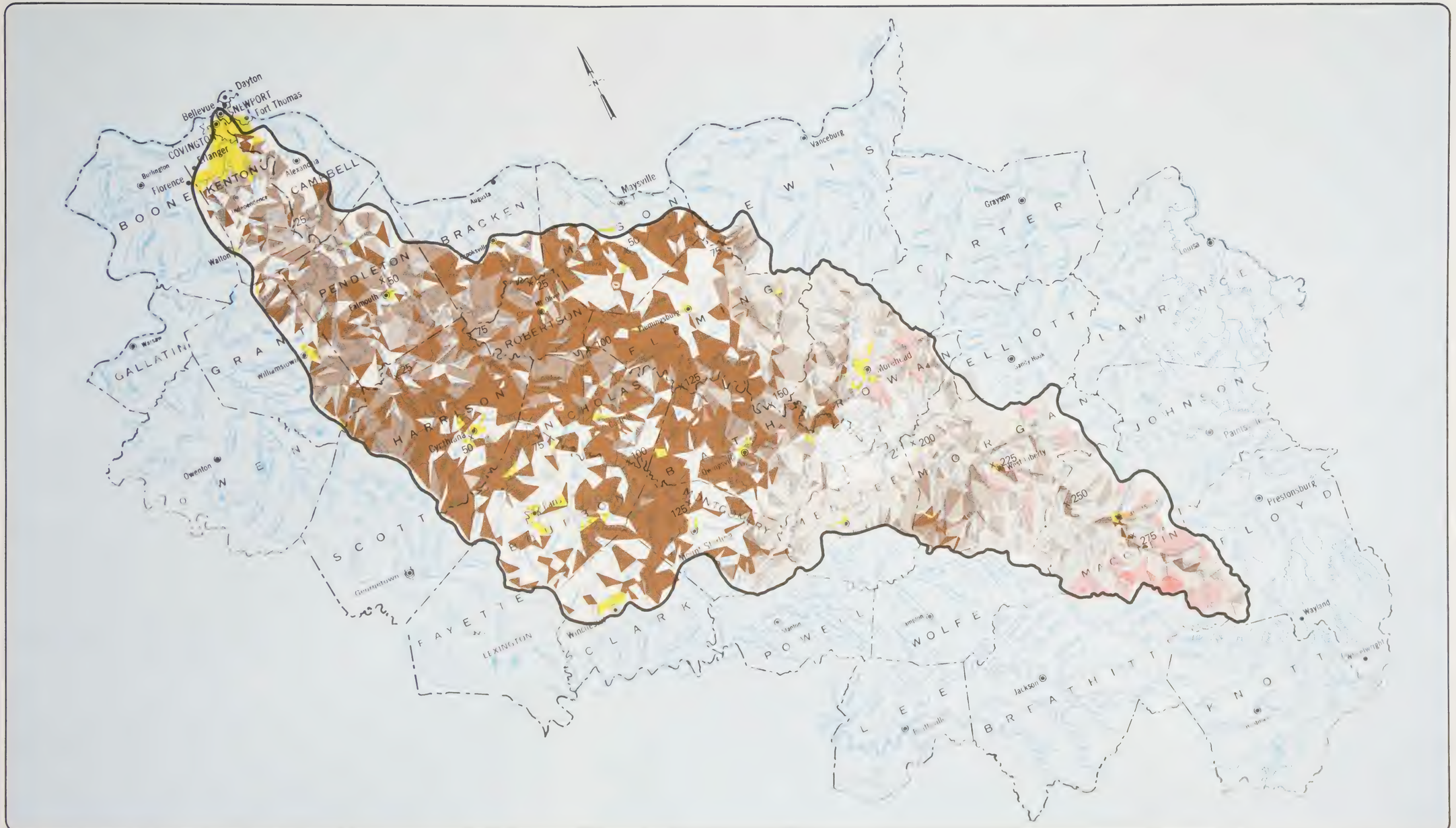
Cincinnati, Ohio Washington D.C.



LICKING RIVER BASIN

EXHIBIT 3.9m-1

LAND USE

THIS EXHIBIT SHOWS LAND USE WITH AGRICULTURE MINING RELATED URBAN

LEGEND

× 50 RIVER MILES

AGRICULTURE

- 1-25%
- 26-50%
- 51-75%
- 76-100%

URBAN

MINING

- 1-25%
- 26-50%
- 51-75%
- 76-100%

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U. S. Geological Survey

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Lexington, Kentucky

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Cincinnati, Ohio Washington D.C.

LICKING RIVER BASIN

EXHIBIT 3.9m-2

LAND USE

THIS EXHIBIT SHOWS LAND USE WITH SILVICULTURE MINING RELATED URBAN

LEGEND

x 50 RIVER MILES

SILVICULTURE

1-25%

26-50%

51-75%

76-100%

URBAN

MINING

1-25%

26-50%

51-75%

76-100%

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

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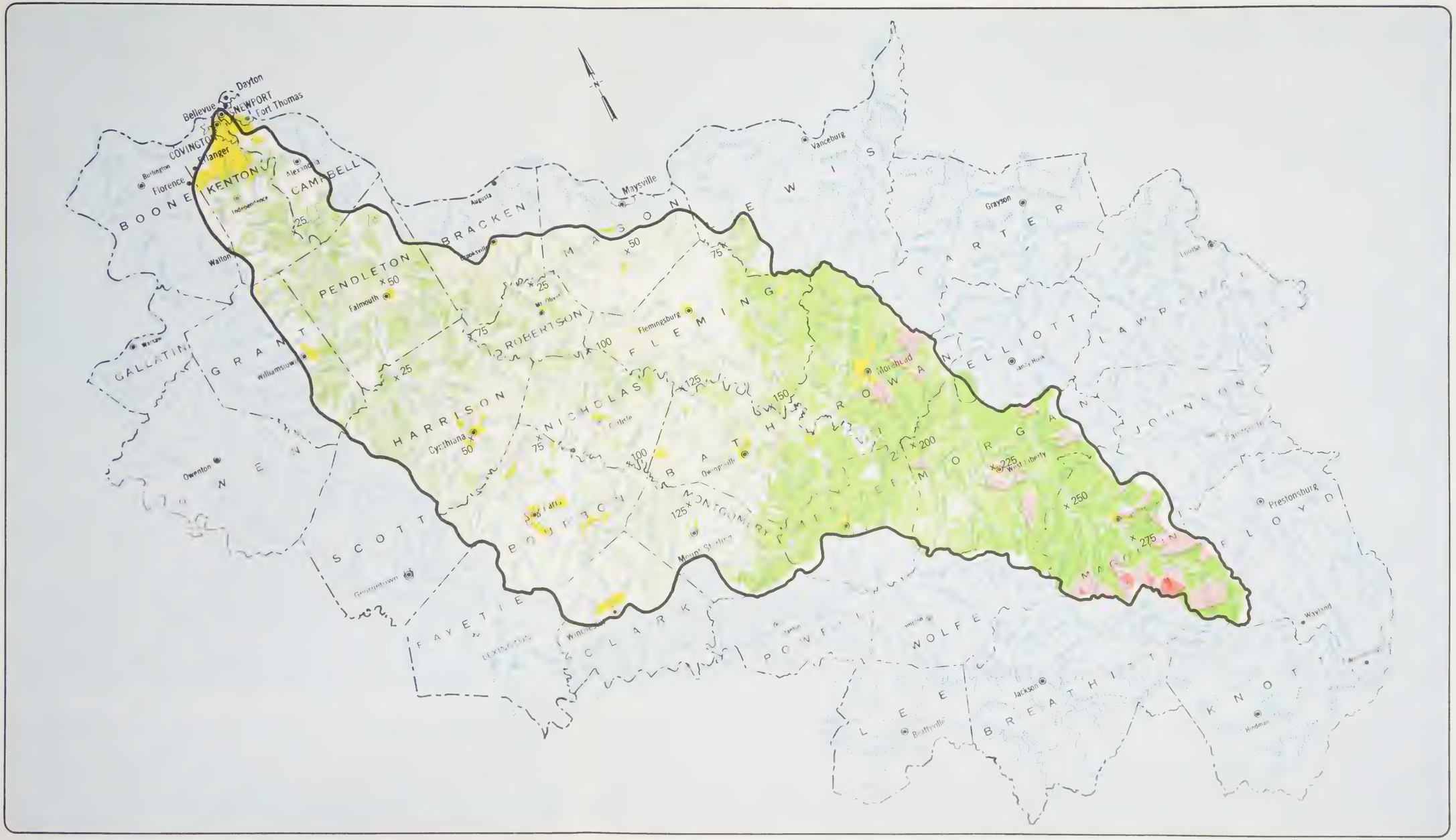

LICKING RIVER BASIN

EXHIBIT 3.9m-2

LAND USE

THIS EXHIBIT SHOWS LAND USE WITH SILVICULTURE MINING RELATED URBAN

LEGEND

x 50 RIVER MILES

SILVICULTURE

- 1-25%
- 26-50%
- 51-75%
- 76-100%

URBAN

MINING

- 1-25%
- 26-50%
- 51-75%
- 76-100%

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U. S. Geological Survey

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chargers are also required to establish a compliance schedule that will enable them to meet the criteria set forth in WP-6-2. A permit system for dischargers under the direction of the Department for Natural Resources and Environmental Protection is also outlined.

The Policy for Addition of Streams Not Shown on the Map, "Streams of Kentucky," stipulates that streams may be included in the "Streams of Kentucky" map if it is demonstrated that the criteria contained in WP-4-1 need to be applied to such waters to protect stream use classifications found in WP-4-1.

It should be noted that, at the time of this writing, the Department for Natural Resources and Environmental Protection is in the process of implementing five new water quality regulations that will basically replace the four existing documents. These five new regulations were adopted on March 13, 1975, published in the Administrative Register of Kentucky on April 1, 1975, and were commented on in a public hearing held May 13 and 14, 1975 in the Auditorium of the Capitol Plaza Tower in Frankfort, Kentucky. A brief summary of these five new regulations follows:

1. 401 KAR 5:005, Permits: Requires a permit prior to construction and operation of a wastewater system and sets forth requirements for receiving a permit to construct and operate such a system.

2. 401 KAR 5:015, Emergency Episodes: Requires that spills and bypasses from waste treatment facilities be reported to the Department for Natural Resources and Environmental Protection.

3. 401 KAR 5:025, Water Quality Criteria: Provides narrative water quality standards for all waters and sets forth a use classification scheme with numeric criteria for applicable waters.

4. 401 KAR 5:035, Stream Classification and Treatment Technology: Applies to the use classifications found in Sections 3 through 9 of 401 KAR 5:025 to certain waters. Additionally, this regulation mandates that all persons discharging pollutants through point sources shall apply "best practicable control technology" and "best available technology economically achievable" by certain dates.

5. 401 KAR 5:045, Minimum Degree of Treatment: Requires a minimum of secondary treatment for facilities which receive biodegradable wastes and treatment in excess of secondary in certain situations. This regulation requires that existing facilities receiving such wastes reapply to the Department for Natural Resources and Environmental Protection prior to January 1, 1976 for a permit to continue operating.

These new regulations, which may undergo minor revisions as a result of input from the public hearing, may be found in their entirety in Appendix E. Since these regulations will not become effective in their revised form until after July 1, 1975, and since these regulations basically set stream water quality and treatment requirements identical to those in Kentucky's existing water quality standards, this river basin plan was based on compliance with the four existing water quality regulations of the Commonwealth.

The implications of Kentucky's water quality regulations to river basin planning is that different criteria must be applied to basin streams, depending on whether or not they are shown on the "Streams of Kentucky" map. Streams which are not contained on this map must only meet the following criteria which are applicable to aquatic life and secondary contact recreation.

1. Dissolved Oxygen: Average daily concentration must be 5.0 mg/l, and concentration must be greater than 4.0 mg/l at any time - aquatic life use standard.

2. Fecal Coliform: Average shall not exceed 2,000 per 100 ml, and maximum shall not exceed 4,000 per 100 ml - secondary contact recreation use standard.

All streams in the basin which are shown on the Streams of Kentucky map must meet the most stringent criteria of all stream use classifications. Exhibit 3.10t outlines water quality criteria applicable to the five stream use classifications and specifies the quantitative limits on various water quality parameters which vary depending upon stream use. For example, different total coliform levels are permissible for recreational waters as opposed to waters used as public water supplies and for food processing. It is, therefore, possible to develop a generalized water quality violation summary from WP-4-1 parameter limits which describes the most stringent criteria for a stream having all uses excluding a put and take trout stream. The following water quality limitations may, therefore, be utilized to determine water quality "violations" in waters classified for all uses, i.e., streams contained on the "Streams of Kentucky" map:

1. pH: No value below 6.0 nor above 9.0 - aquatic life use standard.

2. Dissolved Oxygen: Average daily concentration must be 5.0 mg/l, and concentration must be greater than 4.0 mg/l at any time-aquatic life use standard.

3. Temperature: Stream maximum temperature for each month in °F is:

January	50
February	50
March	60
April	70
May	80
June	87
July	89
August	89
September	87
October	78
November	70
December	57

and maximum temperature increase allowable is 5°F-aquatic life use standard.

4. Dissolved Solids: Monthly average not to exceed 500 mg/l nor 750 mg/l at any time - public water supply and food processing industries standard.

5. Fecal Coliform: Not to exceed monthly geometric mean of 200 per 100 ml during May through October nor 1,000 per 100 ml during November through April-recreational use standard.

6. Total Coliform: Not to exceed monthly average of 1,000 per 100 ml-recreation use standard.

7. Radioactive Substances: Gross beta activity not to exceed 1,000 picocuries per liter (pCi/l), nor

Exhibit 3.10t - Water Quality Criteria Applicable to Specific Stream Use Classification

Stream Use	pH	Diss'lvd Oxygen (mg/l)	Maximum Temperature (°F)	Temp. Increase (°F)	Dissolved Solids (mg/l)	Fecal Coliform /100 ml	Total Coliform /100 ml	Radioac. Substances (pCi/l)	Chemical Constituents (mg/l)	Toxic Substances	Threshold Odor Number
Public Water Supply & Food Processing Industries	--	--	--	--	500(mo. average) 700 (any time)	--	--	B 1,000 S-90 10 a 3	Arsenic .05 Barium 1.0 Cadmium .01 Chromium +6 .05 Cyanide .025 Fluoride 1.0 Lead .05 Selenium .01 Silver .05	--	3
Industrial Water Supply	5.0-9.0	--	95	--	750 (mo. average) 1,000 (any time)	--	--	--	--	--	--
Aquatic Life	6.0-9.0	5.0 (da. avg) 6.0 (any time)	Jan. 50 Feb. 50 March 60 April 70 May 80 June 87 July 89 Aug. 89 Sept. 87 Oct. 78 Nov. 70 Dec. 57	5	--	--	--	--	--	1/10 96 hr. tolerance median level for fish	--
Recreation	--	--	--	--	--	200 (May-Oct) 1000 (Nov-April)	1,000	--	--	--	--
Agriculture	--	--	--	--	--	--	--	--	--	--	--

shall activity from dissolved Strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l - public water supply and food processing industries standard.

8. Chemical Constituents: Not to exceed the following concentrations in mg/l at any time:

Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium(+6)	0.05
Cyanide	0.025
Fluoride	1.0
Lead	0.05
Selenium	0.01
Silver	0.05

-public water supply and food processing industries standard.

9. Toxic Substances: Not to exceed one tenth of the 96 hour median tolerance limit of fish - aquatic life use standard.

10. Threshold-odor Number: Not to exceed 3 - public water supply and food processing industries standard.

The most significant of the above criteria in terms of violation potential are the average daily dissolved oxygen limit of 5.0 mg/l and average fecal and total coliform bacteria limits of 200 per 100 ml (May through October) and 1,000 per 100 ml, respectively.

Consequently, river basin planning must be developed to meet distinctly different criteria, depending on whether or not the stream under consideration is contained on the map, "Streams of Kentucky," in which case, the more stringent water quality criteria apply.

Chapter IV

WATER QUALITY MANAGEMENT STATUS

The basic activities giving rise to, or causing, water quality management problems are characterized in Chapter III. The development related parameters discussed in Chapter III result in water quality management problems because; (1) the increased waste generation which inevitably accompanies development; and, (2) the rising expectations for a high quality environment that inevitably emerge as an indirect consequence of development. The discussion and information in this Chapter address the issue of the existing character of the water quality management program for the Licking River Basin. In considering the existing water quality management programs, it is necessary to resist the temptation to conduct the consideration on the basis of existing perceptions, attitudes, and knowledge. The context for examining existing programs must be the objectives for which the programs were established and whether or not they were met; the popular context of whether or not old programs meet recently formulated objectives is an inappropriate one.

INTRODUCTION

Water quality management, like most systems which strongly involve natural systems, is a wholistic sort of thing; what one does about water quality management, and how one goes about doing it, is determined largely by where one enters the process and how far one is willing to go in any particular direction to realize an objective. The essence of water quality management problems is simple; man's land based activities from which he derives benefits generate wastes which have a deleterious effect on the water resources which also provide benefits to, and in fact are vitally necessary to man. The issue of water quality management is what benefits from his land based activities is man willing to forego, or divert, in order to protect the water resources, the benefits it provides and the needs it meets.

Water quality management programs which exist at any time are usually a direct representation of man's prior misunderstandings of the ecosystem in which he resides. Initially, there was no such thing as water quality management, the capacity of the natural system was assumed to be sufficient to resolve whatever problems resulted from incompatible uses of the water resource, also the feedback from overstressed natural systems was regarded as an inevitable occurrence. When the capacity of natural systems became overtaxed and the consequences were incompatible with man's desire, water treatment was introduced as the first form of formal water quality management. When the protection afforded man by water treatment became insufficient and the pressure to use the water resources for things other than water supply and waste disposal became sufficiently great, waste treatment was introduced as a formal element of water quality management. The water quality management program for the Basin is a result primarily of the immediately preceding approach to water quality management. The approach to water quality management expressed in PL 92-500 is predicated on the assumption/belief that the quantity of waste being generated has become so large relative to the finite quantity of water resource with which it is discharged that treatment alone is no longer sufficient to provide for the desired calibre of resources; thus, control of sources of waste and diversion of wastes from the water resources are viewed as key additional elements of any future water quality management program. Whereas waste treatment does not focus attention on the discrepancies between the available carrying capacity of a water resource and the demand for carrying capacity, source control and diversion do provide such a focus. Additionally, source control and waste diversion provide a direct link between water resource carrying capacity and the types and intensity of land based activities.

At any point in time a water quality management program is an aggregation of discrete and interrelated activities being carried out by persons and institutions that have widely different responsibility boundaries. The key players in the water quality management game in the Commonwealth of Kentucky are the EPA, Corps of Engineers, Department for Natural Resources and Environmental Protection (DNREP), the ADD's, localities, and private business enterprises. Each of the players has had and can be expected to continue to have different objectives, concerns, and commitments relative to water quality management.

The information presented in the subsequent sections of this Chapter addresses the current status of water quality management in the Basin in terms of general water quality and water quality standards of immediate concern, the types and sources of pollution in the Basin, and the existing programs and methods for pollution abatement.

WATER QUALITY OF THE BASIN

The uses of a water resource can be classified as water quality dependent and water quality independent, where water quality dependent uses include sustenance of the natural ecosystem, potable and industrial water supply and recreation, and uses in the latter category include navigation, and wastewater and waste heat disposal. Not all of the existing water quality dependent and water quality independent uses are mutually exclusive; however, the degree to which any or all of the quality dependent uses are realized is directly related to the resources allocated for maintaining the quality of levels supportive of the uses.

In parallel with increased demands on the quantities of water available to support conflicting uses of the water resource, there has been an accompanying evolution in the types of water quality parameters deemed as controlling in the management effort. The earliest effort in water quality management was direc-

ted to the elimination from waste discharges of health and aesthetic related substances which endangered public water supplies. Subsequent emphasis shifted to a concern for protection of the oxygen resources of the receiving stream by requiring the removal of organic carbon forms in waste treatment systems. Later, as understanding developed of the interrelationships between the bacterial decomposer primary producer trophic levels in the aquatic ecosystem, concern shifted to the imposition of treatment requirements designed to reduce the inputs of macronutrients (nitrogen and phosphorus) into the receiving environment. Most recently, the water quality management field is witnessing a considerable expansion in knowledge on the presence of microtoxicants in the environment, and concern for their health related implications in public water supply. It remains to be seen what new types of wastewater treatment standards will evolve from this frontier; however, it is noteworthy that public health, the primary concern in the initial setting of requirements for waste treatment, is again coming to the forefront in the evolutionary process.

The assumption underlying the preceding statements on quality is that there exists a quantity of water for which the quality is to be managed. That is, all of the uses of the water resource, be they quality dependent or independent, require a sufficiency of water if the uses are to be perpetuated, the quantity of water required being a function of the use. In the present cycle of 303(e) Planning, the design flow stream condition, under which the stream standards are to be met, is the seven day Q_{10}, a hydrologic condition based on the assumption that the critical stream quality condition will occur under continuous low flow conditions as opposed to under the transient high flow conditions associated with peak runoff, during which maximal pollutant delivery rates from nonpoint sources occur. Because the demonstration of whether the critical stream quality condition occurs under transient peak flow conditions cannot be done until nonpoint source generation and delivery rates are documented, as the assignment of a subsequent planning cycle, the question of sufficient quantity being available under the design flow condition remains.

The status of development of the hydrologic data base for 303(e) Planning in the Licking River Basin was discussed in Chapter III. It is evident from this analysis that design flows of less than 0.1 cfs exist in most of the streams tributary to the forks of the Licking River. Because of this circumstance, which obviously predates man's participation in, the ecosystem resource of the Basin, it stands to reason that the aquatic biota present in these streams are those which have not been selected against by the cycle (1) recurrence of no flow conditions followed by (2) flashy runoff conditions - obviously hardy species capable of enduring a wide range of water quality conditions under the best of circumstances, when the stream is flowing.

Stream Quality Requirements

Surface water in the Licking River Basin is used for domestic and industrial water supply, fish habitat, and livestock watering, and contact recreation in the recently impounded Cave Run Reservoir. Consistent with these uses, the constituents/parameters of traditional water quality concern have included temperature, pH, color, hardness, chloride, sulfate, nitrate, dissolved solids, suspended solids, DO/BOD, heavy metals and other substances which can be toxic to aquatic life, farm animals and humans.

In order to protect stream quality in support of these uses, the State of Kentucky has water quality regulations which state that, "All the waters of the Commonwealth shall be:

1. Substantially free from substances attributable to municipal, industrial or other discharges or agricultural practices that will settle to form putrescent sludge deposits;
2. Free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges or agricultural practices in amounts sufficient to be unsightly or deleterious;
3. Free from materials attributable to municipal, industrial or other discharges or agricultural practices producing color, odor or other conditions in such degree as to create a nuisance; and,
4. Free from substances attributable to municipal, industrial or other discharges or agricultural practices in concentrations or combinations which are toxic or harmful to human, animal, plant or aquatic life."

In addition to the preceding four requirements which are consistently applicable to all surface waters in Kentucky, State regulations also set specific limitations on certain discrete constituents/parameters for a stream segment when it is to be used for either public water supply, food processing, industrial water supply, aquatic life, or recreation.

Pursuant to the requirements of PL 92-500, Kentucky is now in the final phase of adopting updated regulations which will, in addition to the general areas listed above, require that all discharges of municipal/domestic wastewater receive a minimum of secondary treatment (e.g. 30 mg/l each for effluent BOD and suspended solids) and all discharges of industrial wastewater receive treatment by the best practicable technology which is currently available and economically feasible. These new regulations also require that all point discharges of wastewater receive sufficient, appropriate treatment such that dissolved oxygen (DO) will not go below 5.0 mg/l and ammonia nitrogen (NH_3-N) will not exceed 4.0 mg/l in the receiving water under the 7 day Q_{10} design flow condition.

The stream standards of 5.0 mg/l of DO and 4.0 mg/l of NH_3-N have been (as anticipated) the critical quality dimension in the specification (by the Universities of Louisville and Kentucky) of the treatment requirements for each point discharge in the Licking River Basin. Following from the stream standards and the above stream analysis has been a series of treatment requirements (discussed in Chapter V) that become increasingly stringent in terms of allowable effluent BOD_5, NH_3-N, and DO concentrations, with decreasing values of the seven day Q_{10}, in each case the underlying premise of the treatment requirements being to insure that the use of the aquatic ecosystem for sustenance of the aquatic life be perpetuated. While these standards provide a unifying concept to the 303(e) Planning effort, in the present cycle, it is important to note that: from an ecological standpoint, the presence of the desired forms of aquatic life in a stream is ecologically possible only if the desired forms are not selected against, not because

LICKING RIVER BASIN

EXHIBIT 4.2m

SEGMENT CLASSIFICATION

LEGEND

x 50	RIVER MILES
(20)	SEGMENT NUMBER
▲	DISCHARGERS
	WATER QUALITY LIMITED SEGMENTS (WQL)
	EFFLUENT LIMITED SEGMENTS (EL)

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

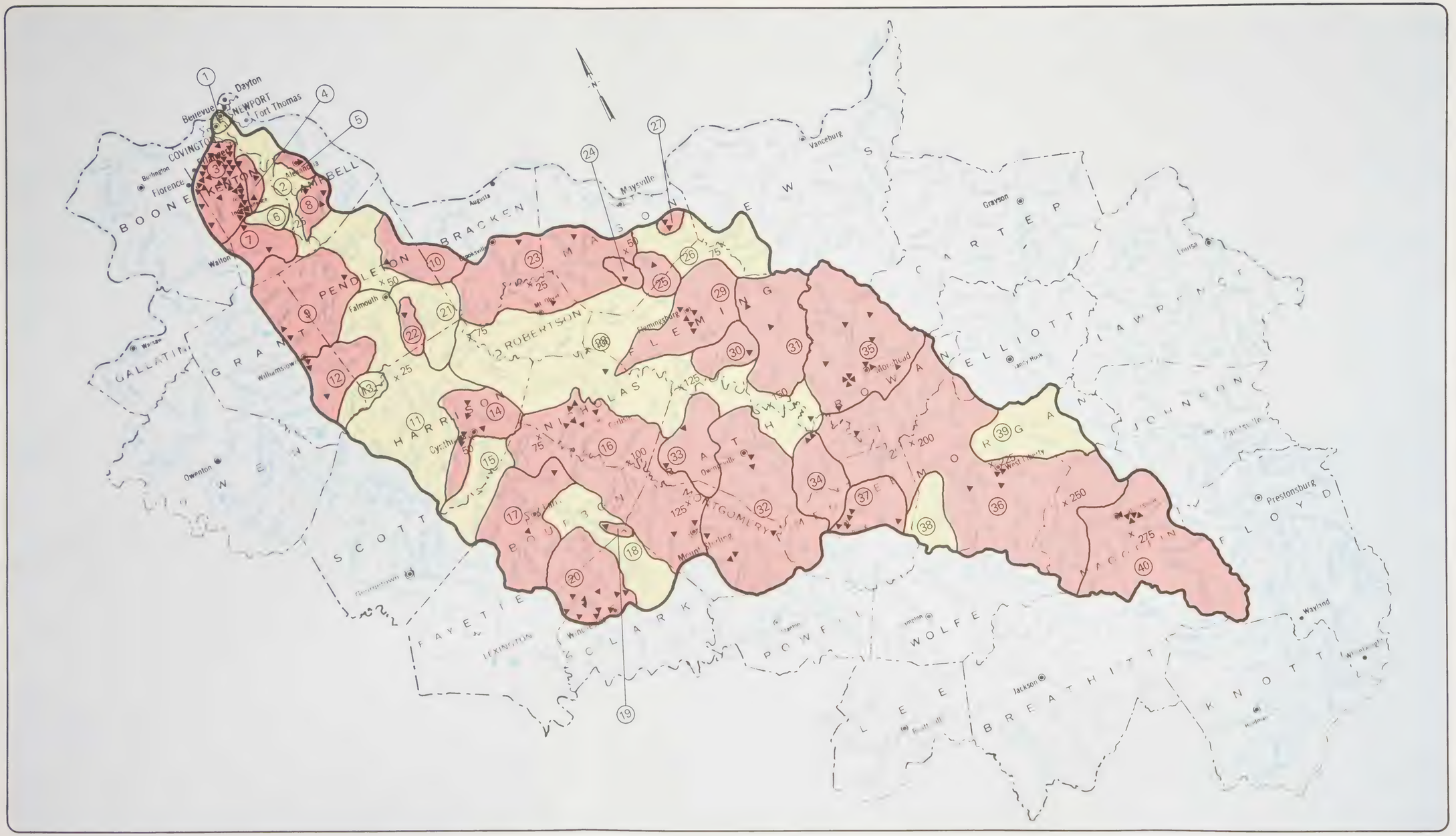
KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PROCTOR-DAVIS-RAY
Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.



LICKING RIVER BASIN

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they are selected for; there is little evidence available to define or indicate which forms have not been selected against in the streams having essentially no flow under the seven day Q_{10} design flow condition; and thus, the implementation of the treatment requirements specified for each discharger in the present 303(e) Planning cycle (i.e., at the present level of understanding of the aquatic ecosystem to be protected) is no guarantee that the desired forms will be established in the aquatic ecosystem.

Water Quality Monitoring Programs

The following types of water quality monitoring programs have been conducted in the Licking River Basin up to the present time (June 1975):

1. Programs by the State of Kentucky, Department for Natural Resources and Environmental Protection, Division of Water Quality, and its predecessor agencies.
2. Programs, interlocked with the State monitoring activities, by the U. S. Geological Survey.
3. Special monitoring programs conducted under State sponsorship, a recent and important example of which being the stream surveys conducted by the University of Kentucky on five stream reaches to provide a data base for development of the modelling tools used in the present 303(e) Planning cycle.

Both the State and U. S. Geological Survey monitoring programs cited above have been conducted on a cooperative basis to serve a number of stream management objectives that have evolved over time as uses of the water resources have intensified and come into conflict, as new technologies for water quality monitoring have been developed, and as information requirements have changed.

A current "picture" of the monitoring network maintained by the State in the Licking River Basin in Fiscal Year 1975 is presented in Exhibit 3.4m, wherein, at the primary station located on the North Fork of the Licking River near Lewisburg, measurements are made of flow and the following types of parameters/constituents: temperature; pH; specific conductance; dissolved solids; common ions; phosphate; and hardness. Flow measurements, but no quality analyses, are done at the other primary stations shown in Exhibit 3.4m. At two secondary stations (the Licking River at Farmers, and the Licking River at Salyersville, located respectively downstream and upstream of Cave Run Reservoir), samples are analyzed for the same types of parameters/constituents as listed above for the Lewisburg primary station. Additional details on the State's Fiscal Year 1975 monitoring program are presented in Appendix A-1, and it is evident from the preceding that the State has placed primary emphasis on characterizing the chemical content of the stream flows originating in the headwaters of the Main Stem Licking River in relation to the coal field operations that have yet to undergo large scale development.

A profile of the types of water quality data developed over time in both the State and U. S. Geological Survey monitoring programs is presented in Exhibit A-1t. The descriptions of the U. S. Geological Survey program was obtained from Reference IV-1. From a review of the listing, it is apparent that: there has been a continual shifting in the locations of active stations over time; the major emphasis in stream quality monitoring has been on sediment transport and chemical quality, and there exists from this record essentially no information of the type required in 303(e) Planning.

In recognition of the need for a stream data base for 303(e) Planning and Commensurate with the time and funds available, the State (under contract with the University of Kentucky) implemented special monitoring programs on a number of stream reaches, one of which (the South Fork Licking River below Cynthiana) is situated in the Licking River Basin (References IV-2 and IV-3). These studies were done during the 1973-1974 low flow seasons for the purpose of developing the data base for calibration and verification of the modelling tools used in the 303(e) water quality modelling for the entire state. Aside from the information developed as a result of this effort, there existed no other data bases developed for the specific requirements of 303(e) Planning, at the start of the present 303(e) Planning cycle. The State of Kentucky has moved to resolve the need for development of the data base necessary for the Kentucky Continuous Planning Process for River Basin Management in the design of its monitoring strategy for the next fiscal year, as discussed in Chapter V.

Existing Water Quality

The existing water quality of the Licking River Basin is affected predominantly by point source discharges from domestic, municipal and industrial wastewater sources. As evidence of the magnitude of these impacts, the modelling results of the present 303(e) Planning effort indicate that, of approximately 1,000 stream miles studied, approximately 384 miles are affected by wastewater discharges to the extent that the predicted DO concentration decreases below 5.0 mg/l (Reference IV-4). Of the 384 stream miles for which this condition was predicted to exist, about 50 miles are affected by industry, 90 miles by municipal sewage treatment plants, and 245 miles by other sources such as schools, trailer parks, motels and commercial establishments.

At the present time, acid mine water pollution from coal mining operations is not reported to exert deleterious effects on water quality in the Licking River Basin, even in that portion of the Licking River located above Cave Run Reservoir (References IV-4 and IV-5). This in large part is due to the limited degree to which the coal resources of the Basin have been developed thus far.

SOURCES OF POLLUTION IN THE BASIN

In the development of an inventory and characterization of the sources of pollution in the Basin both point and nonpoint sources were considered. The traditional definition for point sources was used. The definition of nonpoint sources used in this cycle of the 303(e) Planning process was quite liberal, including almost every source of waste that did not qualify as a point source.

Data pertaining to point sources of pollution in the Licking River Basin were obtained from:

- File records of the Division of Water, DNREP.
- Water and sewer plans prepared by the Northern

Kentucky, Buffalo Trace, and Gateway ADD's.
- Personal communications with owners/operators and engineers associated with water quality management systems.
- Field inspections.

The data obtained from the above sources provided a very comprehensive overview of the point sources of pollution in the Basin; however, it was of limited value in developing detailed characterizations of the point source discharges. In most cases, the data described the type, capacity, owner, and location of a waste treatment facility.

Data pertaining to nonpoint sources of pollution in the Licking River Basin was obtained from:
- Soil conservation Service (SCS) soil maps.
- A map prepared by the Bureau of Planning, DNREP, whereon active and orphan strip mines are located.
- Maps, showing the location and type of solid waste disposal sites, as prepared by the Division of Solid Waste, DNREP.
- Personal communications with various personnel of the Division of Water who had direct knowledge of combined sewers, inadequate septic tank systems, and raw sewage discharges.

The data obtained in the above manner is not an exhaustive delineation of the non-point source pollution sources and problems in the Basin; however, it does represent the existing nonpoint source pollution data base, exclusive of determinations of waste generation and carriage by runoff.

Because for purposes of this 303(e) Planning cycle the water quality modeling and water quality related data and information were not incorporated in, or tied to, ADAPT, the segments previously defined by DNREP for the Licking Basin were used to organize and manage the water quality and waste treatment related data for the Licking River Basin. For a number of reasons, which are discussed in Chapter V, the existing segments were held inviolate throughout the planning effort. The segments are listed in Exhibit 4.1t and illustrated in Exhibit 4.2m. Forty segments existed for the Licking River Basin. The information in the preceding exhibits relating to segment classification, priorities, etc. is described and discussed in the following chapter of this report.

Point Sources

For purposes of this cycle of the 303(e) Planning for the Licking River Basin, point sources were defined as discharges emanating from well defined discharge points and resulting from the management of industrial, domestic, or municipal wastewaters. Municipal discharges are those derived from publicly owned wastewater management systems. Domestic discharges are defined as treated or untreated wastes emanating from sources such as schools, motels, subdivisions, and service stations. Industrial discharges are those comprised of treated/untreated industrial production process wastewaters and cooling water. A total of 180 domestic, industrial, and municipal point source discharges were identified as existing in the Licking River Basin. The total is comprised of 15 municipal discharges, 142 domestic discharges, and 23 industrial discharges.

There are 15 municipalities located partially or totally within the Licking River Basin which have central sewer systems and wastewater treatment facilities that discharge to receiving waters in the Basin. The wastewaters generated in the Town of Brooksville and within the service area of the Campbell-Kenton Sanitary District are discharged to the Ohio River Basin, and the wastewaters from the Town of Williamstown are discharged to the Kentucky River Basin. The discharge rate of the municipal discharges ranges from 0.06 to 2.2 mgd (million gallons per day). The 15 municipal wastewater management systems are collectively collecting and treating an average of 7.72 mgd.

The capacity of the systems associated with the 142 domestic discharges ranges from 500 to 20,000 gpd (gallons per day). The 142 discharges can be categorized as follows:
- 42 of the facilities have a capacity of 2,000 or less.
- 60 of the facilities have a capacity of between 2,000 and 10,000.
- 36 of the facilities have a capacity of between 10,000 and 50,000 gpd.
- 4 of the facilities have a capacity equal to or greater than 50,000 gpd.

Most of the domestic dischargers are located in newly developed areas adjacent to established urban centers. Forty four domestic dischargers occur in the Northern Kentucky Segments 2 and 3. Thirteen discharges are in Segment 20 in the Winchester, Kentucky area. Most of the domestic discharges are to streams which exhibit widely varying flows.

Nineteen industries have a total of 23 discharges in the Licking River Basin. Eight of the industrial discharges are cooling water discharges ranging in magnitude from 35,000 gpd (Tennessee Gas Transmission Company on North Triplett Creek) to 710,000 gpd (Interlake Inc. at RM (river mile) 2.0 on the Licking River). The 15 industrial process wastewater discharges range in flow from 2,000 gpd (Nicholas Dog Food Co.) to 300,000 gpd (Geohogan and Mathias).

The total flow from point source discharges in the Licking River Basin, exclusive of cooling water, is estimated to be 9.25 mgd; this total consists of:
- 7.77 mgd (83.4 percent of the total) from municipal discharges.
- 1.05 mgd (11.4 percent of the total) from domestic discharges.
- 0.48 mgd (5.2 percent of the total) from industrial discharges, i.e., process wastewater.
- 2.3 mgd industrial cooling water discharges.

Significant Point Discharges

Based on selected subjective and objective considerations all existing municipal discharges, all industrial discharges, and all domestic discharges in excess of 50,000 gpd were designated as significant discharges within the Licking River Basin. The location of the significant discharges are shown in Exhibit 4.4m. The preceding designations were based on:
- Federal requirements that all dischargers provide a minimum of secondary treatment i.e. an effluent with no more than 30 mg/l each of BOD and suspended solids by 1977.
- Proposed State standards which extend the

Federal requirements to include an in stream concentration of ammonia of no more than 4.0 mg/l.

- Most if not all, of the municipal discharges are not currently capable of complying in all aspects with the two preceding requirements.
- The cost of upgrading the existing facilities to the levels indicated by the waste load allocations is such that financial assistance to the affected municipalities is essential.
- The very real possibility that 83.4 percent of the total point source discharge in the Basin will be in violation of water quality standards and NPDES Permits by the end of 1977 if corrective actions are not taken.
- Seventeen of the 23 industrial discharges have either been issued NPDES Permits which include compliance schedules, or their current wastewater discharge is estimated to exceed the applicable waste load allocation.
- Three industrial discharges are cooling water flows which contribute significantly to the minimum, sustained flow in dry weather.

Very little information, in addition to the above, was available for use in assessing significant discharges. The model data obtained from the University of Kentucky/University of Louisville regarding water quality and allowable waste loadings was considered in the significant discharges assessment. The model data indicate that essentially all the municipal discharges exceed their allowable loading. The criteria for domestic discharges was quite arbitrary, and based on the premise that such discharges would be designated as significant only if they were equal to or greater in flow than the smallest municipal discharge; and on the assumption that many of the smaller domestic discharges will be eliminated as the 201 Plans are developed and implemented.

Detailed information pertaining to discharges and their characteristics, municipal needs, and priorities is presented in Appendix B on a segment basis. The identification numbers shown in Exhibit 4.4m can be used to access Appendix B. The information presented in Exhibits 4.3t, 4.5t, and 4.7t represent summary tabulations pertaining to the municipal, domestic, and industrial discharges designated as significant discharges. Each tabulation presents data on the location, the NPDES Permit status, and possible future water quality violations for each discharge. The latter factor being obtained by comparing the 1980 waste load allocation with the probable performance capability of each facility based on the treatment technology employed.

The information presented in Exhibit 4.3t pertains to the existing municipal discharges plus the new Strodes Creek Sewage Treatment Plant for the City of Winchester. The 1975 priority number shown in Exhibit 4.3t for each discharge is a characterization of the relative magnitude of the pollution problem created by each discharge, and reflects consideration of the discharge, the receiving water segment and other factors. The detailed process employed to develop priority numbers is discussed in Chapter V. The City of Winchester's Town Branch discharges has the highest priority ranking in the Licking River Basin. The Strodes Creek Sewage Treatment Plant is intended to provide treatment for the Town Branch discharge; thus, the Strodes Creek Sewage Treatment Plant has been designated as a significant discharge.

As shown in Exhibit 4.3t NPDES Permits have been issued for all but three of the municipal discharges designated as significant discharges. Each of the issued permits includes a schedule for providing upgrading of treatment and/or implementing a monitoring program.

The rated capacity of existing municipal treatment facilities ranges from 0.06 mgd for the Butler and North Middleton facilities to 2.2 mgd for the Winchester facility. The combined capacity of the fifteen municipal facilities is 8.875 mgd, the average hydraulic capacity utilization level is 87 percent. The average capacity utilization value is most representative of the nine smallest discharges. The hydraulic loading capacity circumstance at the larger facilities is as follows:

- Elsmere - 8 % over capacity.
- Cynthiana - 11% over capacity.
- Mt. Sterling - 15% over Capacity.
- Winchester - at capacity.
- Morehead - 3% over capacity.
- Paris - 38% of capacity.

The 1974 Needs Survey data indicate that infiltration/inflow is a significant problem in Elsmere, Cynthiana, and Winchester, and that combined sewers are a problem in Cynthiana. Information from the Division of Water, DNREP indicates that the Mt. Sterling facility is subject to organic overloading on an intermittent basis.

Except for the lagoon at North Middleton, the treatment technology used for the municipal treatment plants has traditionally been associated with providing secondary treatment. The wastewaters at Butler, Frenchburg, and Salyersville are subjected to extended aeration treatment. The Falmouth treatment plant is a conventional activated sludge treatment process. The remaining ten municipal discharges are treated by the trickling filter process. Based on available performance data, current loadings, capacities, etc., it has been assumed that only the Falmouth facility will be able to provide an effluent that meets the 1980 waste load allocation. The other 14 municipal waste treatment facilities will require upgrading to meet the assigned waste load allocation.

The four domestic discharges qualifying as significant discharges are listed in Exhibit 4.5t, along with characterizing data for each. Each of the preceding facilities/discharges is located outside the service area of municipal facilities. The extended aeration process is used to provide treatment for each of the four domestic discharges. The Verna Hills Subdivision Treatment Facility includes a tertiary lagoon. It is not expected that the treatment facilities associated with any of the domestic discharges classified as significant will be sufficient to meet the assigned waste load allocations; thus, significant upgrading of the facility will be required.

Information pertaining to the location, NPDES Permit status, and potential water quality violations of the 23 industrial discharges classified as significant discharges is presented in Exhibit 4.7t. NPDES Permits have been issued for 13 of the 23 industrial discharges. The major discharges comprised of process wastewaters are 300,000 gpd (Geohegan and Mathias) and 100,000 gpd (Bluegrass

Knitting). The other 13 process wastewater discharges amount to less than 50,000 gpd each.

Because of the extremely low values of the 7 day 10 year minimum flows in most of the receiving waters in the Licking River Basin, cooling water discharges can have a significant impact on the carrying capacity of the receiving waters. The cooling water discharges become significant discharges because the sustained flow they can provide is and will be critical to making other elements of a water quality management program work.

Disposal of Treatment Plant Residuals

Treatment plant residuals refers to the sludges and other solids (e.g. grit, flotable debris, oils, etc.) removed from wastewaters during the treatment process. In the Licking Basin, most treatment plant residuals consist of grit and sludges resulting from primary sedimentation and secondary sedimentation following biological treatment.

The disposal of treatment plant residuals is a very random and totally unregulated process throughout the entire Licking River Basin. At present, there are no licensed sites for the final disposal of sewage sludges. Biological sludges are usually stabilized by either anaerobic or aerobic digestion, but the locations and characteristics of the ultimate disposal sites for treatment plant residuals are undocumented.

The anticipated ultimate sludge disposal capacity needs for handling the residuals from the treatment of the significant discharges in the Basin are presented in Exhibit 4.12t on a county basis. The projected volumes of sludge production are based on 1980 flows, existing treatment processes for the significant industrial and domestic discharges; proposed treatment processes and 1980 flows were used to project sludge volumes for existing and proposed municipal facilities in the significant discharge class. The potential volumes of sludge to be subjected to ultimate disposal range from 186 ft^3/day in Clark County to 2 ft^3/day in Robertson County.

Non-Point Sources

As used in the present 303(e) Planning process nonpoint sources refers to any actual or potential source of pollutants which is obviously neither domestic, municipal, nor industrial. Nonpoint source pollution may be generated by water flowing over and/or through soils subject to different types of land use and land management, or, in the present 303(e) Planning effort, it may be the pollution resulting from such things as landfill leachate, acid mine drainage, combined sewer overflows, and malfunctioning septic tank systems.

The location of solid waste disposal sites, streams affected by acid mine drainage, municipalities with combined sewers, and areas where dispersed raw sewage and/or inadequate septic system discharges occur are shown in Exhibit 4.8m. Additions/information on the solid waste disposal sites in the Basin including the streams which could possibly be affected by drainage/runoff from these sites is shown in Exhibit 4.9m. The characteristics and magnitude of the nonpoint sources shown in Exhibit 4.8m have not been determined at any level during this phase of the 303(e) Planning process for the Licking Basin; thus, they can only be considered as potential sources of pollution at this time; and until such time as a substantive nonpoint source data base is developed.

The process by which pollutants from the traditional nonpoint sources of pollution reach the water course may be summarized as:

- Generation of wastes on the land,
- Pickup of this waste,
- Transport of the waste by overland flow,
- Deposition of the waste in the stream.

Several models of the processes are being developed, primarily in association with "208" Areawide waste management planning, in order to predict the likely pollutant levels from nonpoint sources reaching the streams under alternative land use schemes. One such model, based on the widely used Universal Soil Loss Equation has been used in the current 303(e) Planning process, and linked to the ADAPT data base, to demonstrate the possibility/feasibility of predicting the pollutant impact of nonpoint sources, and their impact on 303(e) Planning.

The Universal Soil Loss Equation (USLE) is an empirically based method for predicting the amount of sediment that will be lost from a field due to erosion.

Mathematically, it is expressed as:

$$A = RKLSCP$$

where A is the computed soil loss (sheet and rill erosion) in tons per acre per year. A is not the sediment yield;
R, the rainfall factor, is the number of erosion index units in a normal year's rain;
K, the soil erodibility factor, is the erosion rate per unit of erosion index for a specific soil in cultivated continuous fallow, on a 9 percent slope 72.6 feet long;
L, the slope length factor, is the ratio of the soil loss from the field slope length to that from a 72.6 ft. length on the same soil type and gradient;
S, the slope gradient factor, is the ratio of soil loss from the field gradient to that from a 9 percent slope;
C, the cropping management factor, is the ratio of soil loss from a field with specified cropping and management to that from the fallow condition on which the factor K is evaluated;
P, the erosion control practice factor, is the ratio of soil loss with contouring, stripcropping or terracing to that with straight row farming, up and down slope.

Further research has been, or is currently being conducted to relate the value of "A" above to the actual amount of sediment delivered to the stream, and to develop "piggyback" relationships for predicting levels of such pollutants as nitrates, phosphates and pesticides based on the predicted sediment.

In the present 303(e) Planning effort, a simplified form of the USLE was employed to demonstrate its application. Specifically, the ADAPT topographic data base was used to determine values for the slope gradient factor S and the slope length

factor L for each triangle. Values representative of the Basin were selected for the other parameters.

R = 200
K = 0.35
C = 0.1
P = 0.6

A value of 0.1 for the sediment delivery ratio (ratio of sediment delivered to stream to gross erosion) was employed. The sediment load determined as a result of the preceding is present in profile form in Appendix B, for the mainstem of each segment.

In future updates of the 303(e) Planning effort the need for greater attention to the prediction of nonpoint sources is obvious. If the USLE is employed in such an update, better estimates of parameters and ones which make better use of the available data base in ADAPT could be developed. Alternatively, the other prediction methods could be linked to the ADAPT data base to further improve the nonpoint source prediction capability.

POLLUTION ABATEMENT IN THE BASIN

The Regulatory/Planning Arena

Most of the pollution abatement activities for the Licking River Basin which are currently ongoing within the regulatory/planning arena are functions of PL 92-500. At the Federal level, EPA is issuing NPDES Permits for point discharges. At the State level 303(e) Planning is being initiated. Additionally, the State has established a comprehensive, coordinated water quality monitoring strategy (See Appendix A). At the interstate regional level, the Ohio, Kentucky, Indiana Regional Council of Governments (OKI) is currently preparing a 208 Plan for the Cincinnati Metropolitan Area which includes the portions of Campbell, Kenton and Boone Counties located within the Licking River Basin. A principal objective of a 208 Study is to define nonpoint source pollution problems and develop plans and procedures for their control and abatement.

The Corps of Engineers has Congressional authorization to develop a second reservoir on Licking River (Reference IV-6). Development of this project, called Falmouth Lake, is currently in the planning and evaluation stage. The current proposal envisions an impoundment which would extend from just above the confluence of the South Fork along the mainstem of Licking River to just below Cave Run Dam. If and when this reservoir is completed, its impact on water quality management in the Licking Basin will be formidable. Thus, the 303(e) Planning process should establish and maintain a complete and up to date data/information base on the status of this project as it develops, and the potential impacts of the reservoir on water quality management.

The Operations Arena

Approximately 50 percent of the people in the Licking River Basin live inside the service area of a sewage treatment facility. Most of these people live within municipal service areas, the largest being Campbell-Kenton Sanitary District No. 1. The remainder are served by private domestic facilities.

The trickling filter process is the most common form of sewage treatment used for municipal discharges. This process is used at the ten largest municipal discharges in the Basin. The most popular treatment process for domestic discharges is extended aeration; of 142 domestic discharges, 129 are treated using extended aeration "package plants."

In addition to the new treatment facility at Winchester, 201 Facilities Plans are being developed to define the pollution abatement programs for 20 areas within the Basin. The designated 201 Areas include the fifteen municipalities with existing discharges plus the Towns of Taylor Mill, Millersburg, and Mt. Olivet, Bath County Water District No. 2, and Montgomery County Sanitary District No. 2.

WASTEWATER CONTROL NEEDS

Wastewater treatment technologies that will meet increasingly stringent effluent standards are developed in this section. In all,ten effluent standard categories are defined, and their relationships to effluent quality objectives are discussed. Following this general discussion, the effectiveness of the various technologies in acheiving BOD_5 and suspended solids removal, ammonia nitrogen removal, nitrogen removal, and phosporus removal is considered. Possible upgrading alternatives for existing activated sludge, fixed film and lagoon wastewater treatment systems are then, presented. The section closes with brief descriptions of the unit operations and unit processes which make up the wastewater treatment technologies considered in this section.

Wastewater treatment systems are composed of unit operations in which the application of physical forces predominate, and unit processes in which removal of pollutants is accomplished primarily by biological or chemical phenomena. Combinations of unit operations and processes have historically provided an extent of treatment known as primary or secondary. Treatment requirements beyond that provided by secondary unit operations have conventionally been termed as "tertiary treatment" or "advanced waste water treatment." Since the extent of treatment inferred by these terms is arbitrary, that treatment required beyond EPA-defined secondary may be determined by establishing the contaminant removals required prior to discharge or land application. The available unit operations and unit processes may then be grouped together on the basis of compatibility and performance criteria to obtain technologically feasible categories of effluent quality.

The conventional objectives of wastewater treatment are removal of 1) biodegradable organics, 2) suspended solids, and 3) nutrients (nitrogen and phosphorus), and 4) destruction of pathogenic organisms by disinfection.

The objectives of secondary treatment have been the removal of biodegradable organics and suspended solids, and disinfection. More stringent standards have recently focused on nutrient removal for control of eutrophication and ultimate oxygen demand.

The results of an investigation concerning effluent quality requirements and available treatment techno-

logies are shown on Exhibit 4.11t. The available treatment technologies are applied to five major wastewater treatment systems to obtain up-graded effluent standards. The five major wastewater treatment systems considered are (a) activated sludge, (b) fixed film, (c) lagoons and ponds, (d) land application, and (e) physical-chemical.

Ten effluent categories have been selected for this study. Except for EPA-defined secondary treatment, the effluent categories selected primarily represent typical effluent characteristics obtainable from alternative combinations of wastewater treatment processes (i.e. categories are based on technological break points, not on effluent quality standards).

Treatment levels have been established by the State of Kentucky River Basin Planning Group. These treatment levels with their effluent characteristics are related to the effluent categories defined for this study as follows:

Treatment Levels	Effluent Characteristics (mg/L) BOD5	NH_3-N	Do	Effluent Categories
T1A	30	20	4	I
T1B	30	20	8	I & IX
T2A	20	15	4	II
T2B	20	15	8	II & IX
T3A	10	15	4	III
T3B	10	15	8	III & IX
T4A	10	4	4	III & VI
T4B	10	4	8	III & VI & IX
T5A	3	4	4	IV & VI
T5B	3	4	8	IV & VI & IX

The extent of unit operations and processes associated with each effluent category is primarily dependent on the basic BOD removal processes available and modifications required to meet upgraded effluent standards. The five basic types of biological removal processes are biological suspended growth, biological fixed film, lagoon options, land application, and physical-chemical treatment. The extent of treatment or number of unit processes required to meet a certain effluent category is also dependent upon the number and type of existing facilities and flow range. In certain instances, the application of alternative wastewater treatment processes has been divided into two basic design flow ranges, less than 1 mgd, and greater than 1 mgd. These design flow ranges have been selected to provide flexibility and sensitivity in projecting the application of alternative technologies.

The series arrangements in Exhibit 4.11t of effluent quality standards and related applicable treatment unit processes does not necessarily imply a continuous series addition of treatment processes to obtain any one or any combination of desired effluent quality. All treatment processes which are individually capable of meeting any given combination of desired effluent quality would supersede the application of repetitive process requirements. For example a treatment process listed in effluent category VIII may also accomplish some or all of the effluent criteria of categories I through VII.

The ten effluent categories may be combined into 6 basic objectives of wastewater treatment according to effluent quality as follows:

Effluent Categories	Effluent Quality Objectives
I,II,III,IV	Carbonaceous BOD_5 and SS removal
V,VI	Nitrification
VII	Nitrogen removal
VIII	Phosphorus removal
IX	Reaeration
X	Disinfection

Effluent Category I represents EPA-defined secondary treatment effluent standards and constitutes minimum treatment requirements. These effluent standards require BOD_5 and suspended solids effluent concentrations not to exceed 30 mg/L. Effluent Categories II,II, and IV represent increasingly stringent levels of BOD_5 and suspended solids removal. Effluent Category II includes all standards that permit concentrations of both BOD_5 and suspended solids to within a range of 20 to 30 mg/L. Effluent Categories III and IV include all standards which require both BOD_5 and suspended solids concentrations within a range of 10 to 20 mg/L, and less than 10 mg/L respectively. The applicability of utilizing various unit operations and processes to achieve these effluent standards is discussed later in this chapter.

Effluent Category V, seasonal nitrification to 4 mg/L NH_3-N, represents seasonal ammonia nitrogen oxidation to nitrite and nitrate. The 4 mg/L ammonia nitrogen value is intended to represent the limitations of the least efficient processes likely to be implemented for seasonal nitrification requirements. The process requirements incorporated within new systems will generally produce a better quality of effluent when compared to that available from process requirements applicable to upgrading existing secondary facilities.

Effluent Category VI, continuous nitrification to 4 mg/L NH_3-N, represents continuous oxidation of ammonia nitrogen. This category of effluent quality will generally require process additions to conventional secondary treatment.

Effluent Category VII, nitrogen removal to 2-5 mg/L total nitrogen, represents typical total nitrogen standards when such are established. Nitrogen removal to the stated effluent quality range represents two different systems applications. The lower range represents the minimum effluent concentrations currently feasible with available technologies. The upper range represents the application of ammonia removal processes - breakpoint chlorination and ammonia stripping - to biological secondary treated effluent. Nitrification must be limited in the secondary treatment carbonaceous oxidation process

in order to meet the 5 mg/L total nitrogen effluent standard.

A particular note need be referenced to the fixed film nitrogen removal effluent category. Ammonia removal process additions to fixed film biological systems are not conventionally capable of obtaining the required nitrogen removal standards. The two limiting factors are the lack of control of nitrification in warm temperature conditions and the insufficient oxidation of organic nitrogen to ammonia nitrogen in cold temperature operation. Existing or sequential upgrading from secondary treatment, seasonal nitrification, and continuous nitrification are detailed in addition to new process application.

Effluent Category VIII represents phosphorus removal to 1.0 mg/L total phosphorus. The predominant process application for this effluent quality is metal salt addition to secondary or tertiary clarification processes.

Effluent Category IX, comprises reaeration to 5 mg/L DO. The selection of alternative processes available for reaeration will vary according to the type of secondary treatment process and the applicable flow range.

Effluent Category X, disinfection to 200 MPN per 100 ml. (fecal coliform) is intended to represent the EPA secondary treatment requirement.

BOD_5 and Suspended Solids Removal

Effluent Categories I, II, III and IV in Exhibit 4.11t are intended for the removal of BOD_5 and suspended solids. Effluent Category I is EPA-defined secondary treatment to achieve a concentration of 30 mg/L for both BOD_5 and suspended solids. Effluent Category I can normally be achieved by conventional activated sludge, fixed film, lagoons or land application processes.

Effluent Category II can normally be obtained by well operated, conservatively designed activated sludge processes. This category of effluent can also be achieved and exceeded by land application techniques following primary or secondary treatment processes.

Fixed film plants, as well as highly loaded activated sludge processes, will normally require the addition of chemicals to the secondary settling tanks and in some instances additional final settling tank capacity to achieve a concentration of 20 mg/L of both BOD_5 and suspended solids.

Effluent Categories III and IV, with the exception of processes using land application techniques, can only be achieved through the addition of process units to the basic treatment train (activated sludge, fixed film, physical-chemical). For these three treatment trains, the additional process units provide sequentially, as required, some form of filtration, adsorption or chemical treatment.

Physical chemical processes followed by a biological activated sludge process will also achieve both effluent categories.

Ammonia Nitrogen Removal

Effluent Categories V and VI in Exhibit 4.11t are designed for nitrification or ammonia nitrogen removal. The selection of the appropriate processes to achieve nitrification of the wastes depends to a great extent on whether or not nitrification will be required during warm weather periods or throughout the year. This is so because the basic treatment processes, such as activated sludge and fixed film, can be designed or modified to provide the degree of nitrification required during warm weather conditions. It is for this reason that Exhibit 4.11t has two categories for effluent upgrading, one seasonal and the other for continuous operation.

In a system where continuous nitrification is required, biological suspended growth, fixed film, break point chlorination and ion exchange processes are all applicable. The selection of any particular process must of necessity be job specific, taking into consideration local factors such as overall effluent requirements, local economic and site conditions, and available operational skills.

Nitrogen Removal

Effluent Category VII is designed for nitrogen removal. Nitrogen removal can be required to limit eutrophication problems, and to limit the nitrate content where the receiving waters are used as a source of water supply. Since eutrophication problems are more economically, and normally better controlled through the limitation of phosphorus as a nutrient, nitrogen removal for this purpose is not widely practiced.

The selection of any particular process for the removal of nitrogen, depends to a great extent on the degree of nitrification that can be anticipated in the preceeding process train. This is so, because such processes as ammonia stripping, break point chlorination and the ion exchange require a minimum nitrified influent if they are to operate efficiently. In other cases, the preceeding process may inherently produce an effluent of such chemical composition, that it becomes advantageous to utilize a particular process for nitrogen removal. For example, the physical-chemical process can be easily operated to produce an effluent that will have a proper pH range for the efficient operation of the ammonia stripping process.

Phosphorus Removal

Carbon is a major eutrophic nutrient which occurs in such abundance naturally that it cannot be controlled by man. Phosphorus is a key nutrient in the control of eutrophication which can in part be controlled by man. Although phosphorus sources include runoff, industrial wastes, domestic wastes and animal wastes, the most controllable source of phosphorus in aquatic systems is municipal waste.

The major aquatic systems in which phosphorus creates problems are lakes, reservoirs, impoundments and other such water bodies. In these systems the hydraulic detention periods are great enough to allow for the quiescent conditions necessary for the proliferation of nitrogen-fixing blue-green algae. Normally the creeks, streams and rivers are not quiescent and therefore generally the algae growth is not a problem.

The phosphorus concentration is a typical municipal wastewater is about 10 mg/L. It has been reported that municipal wastes may be reduced by as much as 50 percent by eliminating the use of phos-

phates in detergents. Reduction of phosphates to minimal levels in municipal wastes may be accomplished by the addition of metal salts (aluminum or iron) and/or lime. The cost of this type of treatment is a factor in overall operating costs of treatment facilities.

Domestic wastewaters contain nitrogen to phosphorus ratios of about 3 to 4 parts of nitrogen to 1 part of phosphorus. Since green and blue-green algae cells normally contain 12 to 15 parts of nitrogen to 1 part of phosphorus, domestic wastewaters contain an excess of phosphorus over that amount that these algae are able to use. This excess quantity can be utilized by certain nitrogen fixing algae in nitrogen deficient waters and this is one of the mechanisms through which excessive algae blooms can occur, resulting in an increase in the nitrogen budget.

All algae, both green and blue-green thrive as long as both nitrogen and phosphorus are present. If nitrogen becomes limiting, certain species of blue-green algae, namely Nostoc, Anabaena, Aphanizomenon and Gleotrichia can still continue to thrive as long as phosphorus is available. This situation develops in lakes and reservoirs but has not been known to exist in rivers, except possibly in backwater areas.

Where phosphorus is present in excess, most algae use nitrogen and phosphorus in a ratio of about 15 to 1 and will flourish up to ratios of 30 to 1. Before phosphorus can become limiting, the phosphorus level must be reduced to less than 0.5 mg/L when total nitrogen equals 15 mg/L or less than 1.0 if it equals 30 mg/L. This criteria for limiting the discharge of phosphorus is only recommended in treatment plants tributary to impoundments and where there is clear evidence of excessive eutrophication. Removal of nitrogen on the basis of controlling eutrophication does not appear warranted.

As a concrete example of corrective action, municipal waste treatment plants which discharge into impoundments may consider including the facilities necessary for the future addition of metal salts. These features can be included during the next alteration or expansion program. The addition of the metal salts may not be necessary until the monitoring program determines that a potential problem exists.

Use of Exhibit 4.11t

To illustrate the use of Exhibit 4.11t, an example of upgrading an existing wastewater treatment system for an activated sludge option is presented.

Assume that a recently built activated sludge treatment plant of the conventional plug-flow design, which is presently operating to meet EPA-defined secondary treatment, needs to be upgraded to meet more stringent effluent requirements. The recently built plant is shown on Exhibit 4.11t-A under category I-A-1, where I indicates category I, A means a new or recently built plant, and 1 means reference 1 which indicates a conventional plug flow design. To simplify the selection process for upgrading, the plant flow is assumed to be greater than 1 mgd. Assume further that the treatment plant needs to be upgraded to achieve an effluent of 10 mg/L BOD_5 and 10 mg/L SS, and is required to achieve seasonal nitrification at present and continuous nitrification in the near future. There is also a possibility that nutrient removal, and reaeration may be required. Disinfection will also be required.

The effluent requirements for BOD_5 and SS indicate that the treatment plant must meet Effluent Category III. Under Effluent Category III, there are four available alternatives to upgrade an existing plant. These are: filtration, microscreens, land application, or immedium filtration. Any of these processes may be used to meet the BOD_5 and SS requirements. Intermittent sand filtration is not considered because the flow is greater than 1 mgd.

A conservatively designed conventional activated sludge treatment plant with proper operation and maintenance will normally achieve seasonal nitrification. Therefore, assuming that the plant is conservatively designed, in Effluent Category V under A - upgrading from secondary, there is only one alternative for the conventional plug-flow design -- that of adding air capacity and improving oepration and maintenance. This completes the present treatment requirements. The plant, with seasonal nitrification now appears in Exhibit 4.11t-A at V-A-2, a conventional plug-flow design with added air capacity and improved operation and maintenance. Also, an effluent polishing technique has been added to reduce the effluent BOD_5 and SS each to 10 mg/L.

In the future when it becomes necessary to upgrade the treatment plant to achieve continuous nitrification, three alternatives will be available. In continuous nitrification under Effluent Category VI, under B - upgrading from seasonal nitrification, the three available alternatives following V-2 are: to add a second stage suspended growth nitrification unit, to add a second stage fixed-film nitrification unit, or to add an ion exchange unit. The plant now appears in Exhibit 4.11t-A at VI-B-1 with the addition of either nitirification unit alternatives, or at VI-B-3 with the addition of the ion exchange unit alternative.

If, in addition, nutrient removal (total nitrogen and total phosphorus) is also required, Exhibit 4.11t-A gives alternatives for obtaining these effectively. In Effluent Category VII, under C - upgrading from continuous nitrification, the alternatives are presented for total nitrogen removal. For the treatment plants at VI-B-1 with nitrification units either a suspended growth denitrification unit or a fixed-film denitrification unit could be added. If however the ion exchange unit had been chosen to achieve continuous nitrification, no further treatment would be required, since this process achieves the total nitrogen reduction as required

If phosphorous removal is also required, effluent Category VIII presents two alternatives for phosphorus removal: metal salt addition to either primary or secondary treatment, or biological-chemical lime precipitation.

If reaeration of the effluent is required, effluent Category IX, presents three alternatives for achieving a minimum D.O. of 5 mg/l. These alternatives are: diffused aeration, mechanical aeration, or hydraulic aeration.

Effluent Category X, disinfection, presents three alternatives for meeting a fecal coliform count of 200 MPN/100 ml. These options are: an addition of chlorine, ozone, or hypochlorite.

Possible Upgrading Alternatives

Exhibit 4.11t is designed to indicate the most feasible technologies that are available to achieve any particular quality of effluent. This technology can be applied in new or upgrading situations.

Historically, many of the urban centers and small communities have provided wastewater treatment plants which incorporated the latest technology available at the time of design. In such cases, the effluent standards set by the regulatory agencies, the ease of operation, and local parameters were used in selecting the design technology. As the available technology has become more sophisticated and as the public has become more aware of the environmental impacts of wastewater pollution, the effluent standards have become more stringent. Accordingly, many of the existing wastewater treatment plants will require upgrading to meet these new standards.

Of particular interest is the technique that will be used in upgrading existing small wastewater treatment plants. This is because in the aggregate, these plants represent a large economic investment and, therefore, should have a capability of expansion and should provide some measure of flexibility and ease of operation.

In the following paragraphs various techniques that can be reasonably applied to upgrade activated sludge, fixed film and lagoon wastewater treatment systems to produce a nitrified effluent low in BOD_5 and suspended solids are presented and discussed.

Activated Sludge

Existing Activated Sludge wastewater treatment plants can be upgraded by using the following techniques:

Unit Process	Alternative 1	2	3	4
Continuous Nitirification	Add Suspended Growth	Add Fixed Film	Add Breakpoint Chlorination-Dechlorination	---
Polishing BOD_5 and Suspended Solids Removal	Multi Media Filter	Multi Media Filter	Multi Media Filter	Infiltration Percolation
Reaeration	Mechanical Aeration, Diffused Air, or Cascade	Mechanical Aeration, Diffused Air, or Cascade	Mechanical Aeration, Diffused Air, or Cascade	---
Disinfection	Chlorination	Chlorination	---	---

Under Alternative 3, the multimedia filter process should preceed the breakpoint chlorination-dechlorination process within the treatment train. This procedure will reduce the chlorine demand of the wastewater effluent. The techniques shown above usually apply to plants that have design capacities in excess of 1 mgd. With the exception of Alternative 3, all of the alternatives are adaptable to plants having capacities of less than 1 mgd. Alternative 3 is not readily used in small plants because of the complexity and difficulty of properly controlling the breakpoint chlorination-dechlorination process. The land application technique may be more advantageously and more properly applied to small plants because of the reduced land requirements. Alternative 4 is a land application technique, and as such is applicable only in those situations where the soil characteristics and groundwater hydrology will permit land disposal.

Fixed Film

Fixed Film

Single stage high rate fixed film wastewater treatment plants can be upgraded by the following procedures:

Unit Process	Alternative 1	2	3	4
Increased BOD_5 & Suspended Solids Removal	Additional High Rate Stage	Additional High Rate Stage	Additional High Rate Stage	Additional High Rate Stage
Continuous Nitrification	Suspended Growth	Fixed Film	Breakpoint Chlorination-Dechlorination	---
Polishing BOD_5 and Suspended Solids Removal	Multi-Media Filter	Multi-Media Filter	Multi-Media Filter	Infiltration-Percolation
Aeration	Mechanical Aeration, Diffused Air, or Cascade	Mechanical Aeration, Diffused Air, or Cascade	Mechanical Aeration, Diffused Air, or Cascade	---
Disinfection	Chlorination	Chlorination	---	---

As in the case of activated sludge plants, the procedures above usually apply to plants larger than 1 mgd in capacity. For reasons previously stated, the breakpoint chlorination-dechlorination technique is usually not applicable to plants of less than 1 mgd in capacity, and the land application technique may be more reasonably adapted for smaller plants. The essence of the proposed treatment trains is providing an additional high rate stage in the fixed film process, to ensure a reduced BOD_5 load in the continuous nitrification process that follows the high rate stage. In some instances, it may be possible to design the continuous nitrification unit to properly nitrify on a year around basis the effluent from the existing single stage high rate fixed film wastewater treatment plant. In such cases, the additional high rate stage process will not be required.

Lagoons

Facultative lagoons in cold weather climates cannot consistantly produce effluents that will meet secondary treatment standards. One mode of operation that can provide a higher quality of effluent is to have sufficient capacity to store wastewater during the winter months and discharge when the wastewater is of proper quality. Since the necessary input data to permit this mode of operation can only be obtained empirically and is site specific, the system does not lend itself to general selection procedures.

Facultative lagoons are normally designed to produce algae for the purposes of oxygen production, and to convert organic and inorganic pollution loads to cellular matter. The discharge of cellular matter that has an oxygen demand can have an adverse effect on the dissolved oxygen content within the receiving stream. One method of overcoming this objection is to aerate the wastewater contents of the lagoon by mechanical means, and to filter the effluent to remove any cellular matter. With the proper choice of design parameters, such a system can produce an effluent that is well nitrified and that has a low BOD_5 and suspended solids content.

DESCRIPTION OF INDIVIDUAL PROCESSES

The unit operations and unit processes that are designated in Exhibit 4.11t are briefly described in the following paragraphs:

Preliminary Treatment

Coventional:

The main objective of preliminary treatment is the removal of coarse solids. This is usually accomplished with bar racks or screens. Comminutors are sometimes used in place of racks or screens to grind up the solids without removing them from the wastewater. Grit chambers are designed to remove grit, consisting of sand, gravel, cinders, or other heavy solid materials that have settling velocities or specific gravities substantially greater than those of the organic putrescible solids in wastewater. Skimming tanks, grease traps, preaeration, and flocculation are additional processes that may be used to make primary treatment more effective.

Fine Screen:

Fine screens, or inclined wedge-wire screens, are static gravity strainers whose function is to remove solids. Fine screens can be used in lieu of conventional preliminary treatment and in some cases for primary treatment.

Primary Treatment

Sedimentation:

Primary sedimentation is used to remove settleable and floating material from wastewater under quiescent conditions. Sludge is collected in a hopper at the bottom of the tank and scum is skimmed from the surface. Chemicals may be added to promote the precipitation of phosphorus compounds, BOD_5 and suspended solids.

Secondary Treatment - Activated Sludge

The activated sludge process uses suspended microorganisms to oxidize, in the presence of molecular oxygen, soluble and colloidal organics contained in domestic wastewaters. During the oxidation process, new cells are synthesized. Some of the synthesized cells undergo auto-oxidation in the aeration tank, the remainder forming excess sludge. Oxygen is required in the process to support the oxidation and synthesis reactions. The solids generated must be separated in a settling tank, with the largest portion returned to the aeration tank, and the excess sludge withdrawn from the system for further handling and disposal. Due to the flexibility of the process an activated sludge plant may have various modifications.

Conventional (Plugflow):

One modification is referred to as the Convetional (Plugflow) process. In this process the return sludge is mized with the incoming wastewater to the aeration tank, and the combined flow passes through the aeration tank with a minimum of mixing (Plugflow). The rate of return sludge usually varies from 15 to 75 percent of the average design flow, with an average rate of return of about 25 percent. The oxygen is normally supplied from an air source, and is dispersed in the aeration tank by mechanical or diffused air techniques.

Design of conventional activated sludge systems is generally based upon application of a volumetric loading rate and a relationship between the incoming organics and the amount of organisms in the system. The volumetric loading generally ranges between 20 and 40 lb. BOD_5/day/1000 $ft.^3$; the ratio of incoming organics to cells in the system (F/M) is generally between 0.2 and 0.4 lb. BOD_5/lb. MLSS/day. At conservative design loading rates this process will also provide seasonal nitrification of wastewater effluent.

The process has certain design and operating limits, and for this reason other modifications have been developed.

Complete-Mix:

In the complete-mix process, influent wastewaters and recycle sludge are uniformly distributed throughout the aeration tank. This flow distribution resulsts in a more uniform oxygen demand throughout the aeration tank when compared to the Conventional (Plugflow) process This permits a greater operational stability when the system is subjected to slug loads. The process can be designed to accept higher volumetric loadings than the Conventional process with little, if any, reduction in efficiency. Volumetric loadings are 30-50 lb. BOD_5/day/1000 $ft.^3$. The F/M ratio is 0.3-0.5 lb. BOD_5/lb. MLSS/day.

Step Aeration:

In a step aeration process, the influent wastewater is introduced at several points along the aeration tank. The return sludge is introduced at the head end of the tank as is the Conventional process. The process can accept higher volumetric loadings than the conventional process, without any reduction in treatment efficiency. Since the incoming flow is distributed along the length of the aeration tank, the initial oxygen demand is reduced below that experienced in the Conventional process. Volumetric loadings are 40-60 lb. BOD_5/day/1000 $ft.^3$. The F/M ratio is 0.2-0.4 lb. BOD_5/lb. MLSS/day.

Pure Oxygen:

The use of pure oxygen rather than air as a source of molecular oxygen, has the advantage of permitting the highest available volumetric loadings of any known process, with a corresponding reduction in aeration tank capacity. The system also has the advantage of maintaining a high dissolved oxygen content in the effluent, and effective odor control. Pure oxygen systems are generally enclosed and operate under a slight pressure in an oxygen rich atmosphere. Volumetric loadings are 150-225 lb. BOD_5/day/1000 $ft.^3$. The F.M ratio is 0.5-0.8 lb. BOD_5/day/1000 $ft.^3$.

Modified Aeration:

The flow patterns for the incoming wastewaters and the returned sludge are the same as in the Conventional process. Since they are operated at substantially higher volumetric loadings, and F/M ratios, the biological activity is reduced. Aeration requirements and efficiencies are less than those of the conventional system due to this reduced biological activity. The volumetric loading is 75-150 lb. BOD_5/day/1000 $ft.^3$. The F/M ratio is 1.5-5.0 lb. BOD_5/lb. MLSS/day.

Contact Stabilization:

As in the step aeration process this modification involves a change in feed location to the aeration tank. In the process, the return sludge is returned to a reaeration tank, and the incoming wastewater is mixed with the reaerated sludge in a contact tank. Air requirements are similar to those of the conventional process. The process, similar to the step-aeration process, is capable of accepting higher volumetric loadings than the conventional process without reductions in efficiency. Volumetric loading is 40-60 lb. BOD_5/day/1000 $ft.^3$. The F/M ratio is 0.20-0.4 lb. BOD_5/lb. MLSS/day.

Extended Aeration:

The extended aeration process is a complete mix system that is designed to operate in the endogenous phase of the growth curve. This necessitates a relatively low organic loading and long aeration time. For this reason, the process is generally applicable only to small wastewater treatment plants of less than 1 mgd. capacity. Volumetric loading is 10-15 lb. BOD_5/day/1000 $ft.^3$. The F/M ratio is 0.03-0.10 lb. BOD_5/lb. MLSS/day.

Oxidation Ditch:

The oxidation ditch process is an extended aeration process that can be designed to operate on an intermittent or continuous basis. Oxygen for the process is supplied from an air source by means of a series of hydraulically operated motors. Due to the allowable loadings, the process is applicable only to small treatment plants. Volumetric loading is 10-15 lb. BOD_5/day/1000 $ft.^3$ and the F/M ratio is 0.03-0.10 lb. BOD_5/lb. MLSS/day.

Secondary Treatment-Fixed Film

Trickling Filters Low Rate:

A trickling filter is a biological reactor which provides surface area upon which microorganisms can grow. Wastewater is applied intermittently to the top of a bed of coarse stone or synthetic media. While percolating through the filter, the wastewater flows over the microbial film and the soluble organics are readily metabolized and the colloidal organics adsorbed onto the surface. The wastewater is collected at the bottom of the filter in an underdrain system and conveyed to a settling tank where excess biological growth is separated from the liquid effluent.

When used for conventional secondary treatment, low-rate trickling filters are designed for hydraulic loadings of 1-4 mgd/acre, and organic loadings of 5-20 pounds of BOD_5/day/1000 $ft.^3$. Depending on the climate, conservate design loading rates may provide nitrification of the wastewater effluent.

Trickling Filters High Rate:

The biological process invloved is the same for the low-rate trickling filters. High-rate trickling filters used for conventional secondary treatment are designed for hydraulic loadings of 10-40 mgd/acre and organic loadings of 30-60 lb. BOD_5/day/1000 $ft.^3$. In contrast to the low-rate system, the recirculation of filter or clarifier effluent permits both higher and more uniform hydraulic loadings. However, the higher organican loadings do not permit nitrification to occur as readily as in low-rate systems.

Rotating Biological Contactors:

Rotating Biological Contactors (RBC's) consist of a series of closely spaced circular discs of polyvinylchloride, 40 percent submerged in a vat of wastewater, and rotated slowly through the waste. Biological growths become attached to the surface of the discs and eventually form a slime layer over the entire surface area of the discs. The rotation of the discs alternately contacts the biomass with the organic material in the wastewater and then with the atmosphere for adsorption of oxygen. The disc rotation effects oxygen transfer and maintains the biomass in an aerobic condition. The rotation is the mechanism for removing excess solids from the discs by the shearing forces it creates, and also the means of maintaing the sloughed solids in suspension so they can be carried from the unit to a clarifier. In addition to their use for secondary treatment, RBC's can also be operated to accomplish seasonal and continuous nitrification.

Secondary Treatment-Lagoon

Aerated:

An aerated lagoon is a basin in whch wastewater is treated on a flow-through basin. Oxygen is usually supplied by means of surface aerators or diffused aeration units. The action of the aerators and that of the rising air bubbles from the diffuser is used to keep the contents of the basin in suspension. In effect the essential function of this type of lagoon is waste conversion. In a completely mixed lagoon neither the incoming solids nor the biological solids produced settle out. Depending on the detention time, the effluent will contain about one-third to one-half the value of the incoming BOD_5 in the form of cell tissue. Before the effluent can be discharged, however, the solids must be removed by settling.

Low-Rate Stabilization:

A stabilization lagoon is a body of water contained in an earthen basin of controlled shape, which is designed for the purpose of treating wastewater. These ponds are also called oxidation ponds. Three zones exist in these ponds: (1) a surface zone where aerobic bacteria and algae exist in a symbiotic relationship, (2) an anaerobic bottom zone in which accumulated solids are actively decomposed by anaerobic bacteria, and (3) an intermediate zone that is partly aerobic and partly anaerobic, in which the decompisition of organic wastes is carried out by faculative bacteria. In these ponds, the suspended solids in the wastewater are allowed to settle to the bottom. The maintenance of the aerobic zone serves to minimize odor problems, because many of the liquid and gaseous anaerobic decomposition products, carried to the surface by mixing currents, are utilized by the aerobic organisms. Stabilization lagoons, also called facultative lagoons, have been used to provide seasonal and continuous nitrification of wastewater.

Intermittent Discharge:

Facultative lagoons are usually used and operated in series. Sufficient capacity is planned so that all the wastes can be held in the lagoon for a period of six months to one year. During the spring and/or fall period, and after the lagoon contents have stabilized, the final cell in the series arrangement is isolated from the preceding cells. This insures no subsequent short circuiting of any raw sewage for this period of time. The level of dissolved oxygen is measured n the final cell and in the stream along with the volume of flow in the stream. When all conditions are considered correct, the effluent line to the receiving water is opened and the contents of the final cell are discharged over a period of two weeks to one month. Intermittent discharge lagoons can be used to meet secondary effluent standards.

Secondary Treatment-Filtration

Intermittent Sand:

Intermittent sand filtration is a process in which wastewater is intermittently applied to a sand filter. After passing through the filter media, the effluent is collected in an underdrain system. Periodically, the filter media will become clogged with trapped particles. At this time the top surface of the filter is raked and/or replaced, and the cycle repeated. Intermittent sand filters require considerable land area and are therefore primarily used in rural areas where land is cheap. Intermittent sand filtration can also be used as apolishing process to upgrade existing wastewater treatment facilities,

Secondary Treatment-Physical-Chemical

Independent Two-Stage Lime Coagulation:

In the physical-chemical treatment process, lime is added to the raw wastewater in two stages to reduce the level of suspended organic solids and soluable phosphates. In the first stage sufficient lime is added to raise the pH over 11 to remove the phosphorus as a calcium phosphate precipitate and to form calcium carbonate as a coagulant for suspended solids removal. In the second stage gaseous carbon dioxide is added to lower the pH to approximately 10 in order to remove the excess soluble calcium as a calcium carbonate precipitate. The quantity of lime to be added is largely a function of the raw wastewater alkalinity and generally will fall in range of 300 to 400 mg/L of CaO for two-stage lime treatment. A large protion of this lime can be obtained from recovering the calcium in the sludge from the two clarifiers. The sludge is transported to a thermal regeneration facility where the calcium carbonate is decomposed to lime. The carbon dioxide from this thermal process, or another source of stack gases, can be used as the source of CO_2 in the second stage precipitation of calcium carbonate.

Polishing Techniques

Additional Secondary Sedimentation:

Secondary sedimentation is used to remove settleable and flating material from wastewater under quiescent conditions. Sludge is collected in a hopper at the bottom of the tank and scum is skimmed from the surface. Chemicals may be added to promote the precipitation of phosphorus compounds, BOD_5, and suspended solids. Design of secondary sedimentation tanks is dependent on the type of biological treatment preceding it.

Additional secondary sedimentation is sometimes added to existing facilities to meet a more stringent effluent quality. This is basically accomplished because of the additional detention time and overflow rate provided, which makes a higher recovery of suspended solids possible.

Chemical-Polymer Addition to Secondary Clarifiers:

In certain processes solids may not flocculate and settle well in the secondary clarifier. This problem may become acute in plants that are overloaded. The addition of Al or Fe salts will cause the precipitation of metallic hydroxides and/or phosphates. Al and Fe salts, along with certain organic polymers will also destabilize colloidal particles. The resultant destabilized colloids and precipitates will settle readily in the secondary clarifier, reducing the effluent suspended solids, and effecting phosphorus removal.

Microscreens:

Microscreening is a physical straining process normally used to remove suspended solids from secondary effluents for polishing purposes. The process consists of a variable speed rotating drum mounted horizontally in a tank with two compartments. The influent enters the drum from one end and flows out radially through the filtering media attached to the drum's periphery. Backwashing is accomplished at the top of the drum where pressure jets of strained effluent are sprayed onto the screen to dislodge the accumulated solids. The solids flushed from the screen can be recycled to the head of the plant or conveyed to the sludge handling system.

Multi-Media Filtration:

Filtration is used in wastewater treatment as an intermediate or final polishing step for removal of suspended solids and will produce a small reduction in BOD_5. Additional phosphorus may also be removed if the wastewater is previously treated with alum. Multi-media filter beds have been composed of various combinations of anthracite, sand, garnet, and activated carbon. The process may require precholorination to prevent buildup of biological growths on stationary components of filters. Backwash systems are required and high rate filtration may require a polymer feed system to contain breakthrough.

Immedium Filtration:

Immedium filters are primary used in wastewater treatment as an intermediate or final polishing technique. Immedium filtration is a high rate upflow filtration process by which influent wastewater enters the bottom of the filter and flows upward through the filter bed. Backwashing involves pneumatic agitation of the media followed by washing, which expands the bed about 2 percent. Raw or filtered water can be used for backwashing because the filter is washed in the same direction as the flow.

Granular Carbon Adsorption:

Activated carbon treatment of wastewater is usually used as a final polishing process. Wastewater is passed through a columnar bed of granular activated carbon where certain soluble organics are physically and chemically adsorbed in the micropore structure of the carbon. Usually, there is biological activity within the column which aids in the removal of both soluble and suspended organic material. Filtration of suspended solids can be achieved depending on the design of the carbon column. Backwashing facilities are needed and a regeneration system is required to remove the material adsorbed on the carbon.

Powdered Carbon Adsorption:

Powdered activated carbon can be added to biological treatment effluents as a polishing process. The carbon can be added directly to the secondary clarifier or to a separate contact basin. Soluble organics are removed by both adsorption and biological processes on the carbon surface. Since the carbon is very fine, a coagulant may be needed to aid in the removal of carbon particles, or filtration may be required; a regeneration process has not yet been developed for powdered carbon.

Tertiary Two-Stage Lime Coagulation Filtration:

The two-stage lime coagulation-filtration process, as previously described under secondary treatment, can also be used as a tertiary polishing technique that will appreciably reduce the BOD_5 suspended solids and phosphorus concentration.

Upgrading Lagoons

Recirculation Pumping:

Recirculation pumping to upgrade lagoons involves interpond and intrapond recirculation as opposed to mechanical mixing in the pond area. The effluents from pond cells are mixed with the influents to the cells. In intrapond recirculation, effluent from a single cell is returned to the influent to that cell. In interpond recirculation, effluent from one pond is returned and mixed with influents to another pond. Both methods return active algae cells to the feed area to provide photosynthetic oxygen to satisfy the organic load. Recirculation can affect startification in ponds, and thus gain some benefit ascribed to pond mixing. Pond recirculation is not generally as efficient as are mechanical systems in mixing facultative ponds. The major advantages of recirculation are a decrease in the organic loading and prevention of odors and anaerobic conditions in the feed zone of the ponds. Recirculation is usually accomplished with high-volume, low-head pumps.

Aeration:

Aeration is used in upgrading lagoons to supplement the pond's photosynthetic oxidation capacity in instances where the pond must treat high seasonal BOD_5 loadings, or must operate under winter conditions, or where there is little room for expansion. This supplementation is usually achieved by installing compressed air diffusers or mechanical aerators In addition to transferring oxygen to the liquid, aeration breaks up the thermal stratification that normally develops in oxidation ponds. The mixing derived from the aeration process tends to maintain aerobic conditions deeper in the pond. Aeration systems also serve to prevent odors usually generated in overloaded ponds.

Rock Filters:

Submerged rock filters have been proposed as a method of upgrading lagoons by reducing the algae which is often present in the final effluent. The filters are constructed of rock sizes greater than 2.54 cm. and less than 12.70 cm. A biological slime layer becomes established on the filter media and as the wastewater flows through the filter horizontally, the suspended solids are adsorbed by the biological growth. During part of each year the biological slime layer will function in an anaerobic environment. Therefore, an aeration facility for the filter effluent will be required. The rate of solids accumulated in the filters is very slow making the effective life of the filter approximately 20-30 years.

Flotation-Clarification:

Flotation-clarification is a means of algae remove used in upgrading lagoons. Separation depends on the formation of fine bubbles that are physically attached to the algae causing them to float to the tank-water surface where they are collected and removed. Chemical coagulation enhances the removal. It is the algae-bubble-chemical matrix that is desired for good flotation, rather than large aggregates of chemically bound algae needed for sedimentation. No mechanical flocculation step is provided in flotation. Two modes are available for the formation of the fine bubbles: dissolved-air flotation and autoflotation. In dissolved-air flotation, a portion of the effluent or influent is pumped to a pressure tank where the liquid is agitated in contact with high-pressure air to supersaturate the liquid. When this pressurized stream is released into the influent, fine air bubbles are formed. These bubbles are then coagulated with the algae cells by the rapid addition of chemicals. The algae-chemical-bubble float is then removed at the surface of the tank. Autoflotation differs only in that no pressurization is required for the formation of the fine bubbles.

Seasonal Nitrification

Roughing Filter:

Roughing filters are fixed film biological systems in which a microorganism population develops on the wetted surfaces of the media. Roughing filters have been used ahead of conventional secondary treatment for reducing unusually high influent BOD_5 concentrations. In the seasonal nitrification application the purpose of the process is to reduce the organic load so that a downstream biological process will dependably nitrify the waste during the summer months.

Conventional Activated Sludge:

The conventional activated sludge process, as previously described under secondary treatment, can be used to provide seasonal nitrification of wastewater effluent at conservative design loading rates.

Low-Rate Trickling Filter:

A conservatively designed low-rate trickling filter process, as previously described under secondary treatment, can provide seasonal nitrification with low organic loadings.

Continuous Nitrification

Chemical Addition to Primary Treatment:

The additional BOD_5/SS removals afforded by chemical additions to primary treatment may solve overloading problems on downstream biological systems, or may allow nitrification - either seasonal or continuous, depending on the biological system designs. High pH primary effuents are amenable to NH_3 removal by ammonia stripping.

Suspended Growth:

In a controlled environment, certain microbial population will convert ammonia to nitrate in the presence of oxygen. Nitrosomonas act on dissolved ammonia to form nitrite, which in turn is converted to nitrate by Nitrobacter. This process is carried out in an activated sludge system downstream from conventional secondary treatment or primary treatment with chemical additions. The oxidation of ammonia to nitrate can be carried out with either air or pure oxygen. Because the microbial conversion causes a drop in pH, provision should be made for lime or caustic addition with low alkalinity wastewaters.

Extended Aeration Activated Sludge:

The extended aeration activated sludge process, as previously described under secondary treatment, can be used to provide seasonal or continuous nitrification of wastewater effluent at conservative design loading rates.

Oxidation Ditch Activated Sludge:

The oxidation ditch activated sludge process, as previously described under secondary treatment, can be used to provide seasonal or continuous nitrification of wastewater effluent at conservative design loading rates.

Second-Stage Trickling Filter:

Second-stage trickling filters have been utilized to obtain seasonal and continuous nitrification. Two trickling filters are operated in series with an intermediate clarifier between them. The first stage filter operates as an ordinary trickling filters and consumes most of the organic loading. When the wastewater reaches the second-stage filter the organic loading is very low and this allows autotrophic nitrifying bacteria to form on the filter media. These bacteria convert the ammonia present in the wastewater to nitrites and nitrates. The well-nitrified effluent reduces the total oxygen demand in the receiving water.

Rotating Biological Contactors:

The rotating biological contactors process, as described under secondary treatment, can also be used if properly designed to provide seasonal or continuous nitrification.

Intermittent Sand Filtration:

The intermittent sand filtration process, as previously described under secondary treatment, can be used to provide seasonal or continuous nitrification.

Facultative Lagoon:

Facultative lagoons have been used to provide seasonal and continuous nitrification of wastewater. For a description of the biological process involved see Low-Rate Stabilization Lagoons under secondary treatment.

Nitrogen Removal

Breakpoint Chlorination:

When chloride gas is added to wastewater containing nitrogen in the ammonia form, hypochlorous acid reacts with ammonia to produce chloramines. Further addition of chlorine to the breakpoint converts the chloramines to nitrogen gas. The reactions involved are dependent on pH, temperature, contact time, and initial chlorine to ammonia rates. A pH control system is usually necessary. Air may be added to the reaction chamber to aid in mixing and to strip nitrogen trichloride, carbon dioxide, and nitrogen gases from solution. Due to toxicity, dechlorination often accompanies this process.

Ammonia Stripping:

Ammonia stripping involves the conversion of NH_4+ ions to dissolved NH_3 gas by raising the pH of the wastewater to 10.8-11.5. The ammonia is then removed from soltuion by providing air-water contact in stripping towers or ponds.

Selective Ion Exchange:

Certain natural zeolites will selectively remove ammonia from solution. This process is carried out in columnar reactors of either the gravity or pressure flow type. When a column's removal capacity is echausted, the resin is regenerated.

Suspended Growth Dentrification:

Nitrogen in the form of nitrates can be converted to nitrogen gas by bacterial populations in the absence of oxygen. This process is carried out in a plugflow activated sludge system following any process that converts ammonia and organic nitrogen to nitrate (nitrification). The bacteria obtain energy for growth from the nitrate-nitrogen reaction, but require an external source of carbon for all synthesis, because nitrified effluents are usually low in carbonaceous matter. Methanol is commonly used as a carbon source, but nutrient poor industrial wastes have also been employed. Nitrogen gas formed in the denitrification reaction will hinder mixed liquor settling. Therefore, a nitrogen gas stripping reactor should precede the dentrification clarifier. Polishing of residual methanol-induced BOD_5 is an added benefit of the stripping tank.

Fixed Film Dentrification:

Nitrogen in the form of nitrates can be converted to nitrogen gas by bacterial populations in the absence of oxygen. This process is carried out in a columnar reactor containing stone or synthetic media size, this process may not need to be followed by a clarifier, as in the conventional trickling filter system. Adequate solids wasting occurs through the low level suspended solids carry-over in the effluent. Periodic backwashing and/or air scouring is necessary to prevent solids buildup in the column that can cause excessive head loss. As in the suspended growth dentrification system, an external carbon source is necessary; methanol is commonly used, and nutrient poor industrial wastes are potential carbon sources. Most applications of this process involve the downflow mode (either gravity or pressure), an expanded bed (upflow) technique has been tested.

Phosphorus Removal

Independent Physical-Chemical Two-Stage Lime Coagulation:

The physical-chemical two-stage lime coagulation process, as described under secondary treatment, can be used to obtain phosphorus removal from wastewater effluents.

Chemical Addition to Primary Treatment:

Chemical addition to primary treatment can be used to obtain phosphorus removal from wastewater effluents.

In the chemical addition process, ionic forms of Ca, Fe, or Al are added to raw wastewater. The Fe or Al react with the soluble orthophosphorus to produce a precipitate. When lime is used, both the Ca and OH react with the ortho-P to form an insoluble hydroxyapatite. Organic Phosphorus and Poly-phosphate are removed by more complex reactions and by sorption onto floc particules. The insoluble phosphorus, as well as considerable BOD_5 and suspended solids, are removed from the system as primary sludge. Violent mixing and flocculation are necessary upstream of the primaries. Addition of polymers may be required to aid in settling. A base is sometimes necessary in low alkalinity waters to keep the pH in the 5-7 range with mineral addition. Lime recalcination will lower chemical costs, but is a feasible alternative only for larger plants. Phosphorus removal with lime is limted to about 30 percent because the higher pH levels required for more efficient removal are inhibitory to biological systems. Therefore, recarbonation may be required if high phosphorus removals are to be accomplished in the primaries and followed by biological systems.

Metal Salt Addition to Secondary Treatment:

Metal salts are added to the raw wastewater, activated sludge aeration tank, or to the final clarifier influent channel. With trickling filter systems, the salts are added to the raw wastewater or the filter effluent. Multipoint additions have been successful. Phosphorus is removed from the liquid phase through a combination of precipitation, adsorption, exchange, and agglomeration and it is wasted with the primary and/or secondary sludges. The use of lime or ferrous salts is limited because they produce low phosphorus levels only at high pH's which are not compatible with biological treatment. Improved settling and lower effluent BOD_5 result from chemical addition, particularly if polymers are also added to the final clarifier.

Biological-Chemical:

This process utilizes both biological and chemical removal mechanisms to effect phosphorus removal with considerably reduced chemical usage than that of chemical addition methods. This process is only applicable to treatment plants that use the activated sludge form of secondary treatment.

The system consists of three major process steps; 1) Primary effluent enters the aeration tanks where biological absorption of the dissolved phosphorus in the wastewater is accomplished by the phosphorus deficient micro-organisms present; 2) The return sludge from the final clarifiers is introduced to an anaerobic stripping tank, similar to a gravity thickener, prior to recirculation to the aeration tank. Under anaerobiosis the microorganisms release the absorbed phosphorus to the supernatant and renders the return sludge to the aeration tanks devoid of phosphorus. The return sludge is then available to repeat the cycle; 3) The concentrated supernatant is treated with lime and returned to the primary clarifiers where the chemical sludge settles out with the primary sludge.

Land Disposal

Irrigation:

Irrigation is the most common land application technique and involves the application of primary or secondary effluent to the land for treatment and to aid the growth needs of plants. The wastewater is treated by physical, chemical, and biological means through interaction with the soil and plants. Effluent can be applied to crops or vegetation either by spraying or surface techniques for purposes such as avoidance of surface discharge of nutrients; economic return from use of water and nutrients to produce marketable crops; water conservation; or preservation and enlargement of greenbelts and open space.

Infiltration-Percolation

Infiltration-percolation consists of the application of effluent to the soil by spreading in basins or by spraying. Treatment occurs as the water percolates through the soil matrix. Because application rates are high, porous well-draining sand soils that function as natural filters are required. Infiltration-percolation systems can be designed for groundwater recharge; natural treatment followed by pumped withdrawal or underdrains for recovery; or natural treatment with renovated water moving vertically and laterally in the soil and recharging a surface watercourse.

Overland Flow:

In this method of land application wastewater is sprayed over the upper reaches of sloped terraces and allowed to flow across the vegetated surface to runoff collection ditches. Renovation is accomplished by physical, chemical and biological means as the wastewater flows in a thin sheet down the relatively impervious slope. It is essentially a biological treatment process with a minimum contact time between bacteria and wastewater required for adequate treatment.

Reaeration

Hydraulic:

Hydraulic aeration or cascade aeration is a post-aeration process which is used to increase the dissolved oxygen content of wastewater effluent. The plant effluent passes over a series of steps or weirs, at the base of which air is entrained and dissolved in an amount which is related primarily to the height of the fall.

Diffused Aeration:

Diffused aeration for reaeration increases the dissolved oxygen content of the effluent stream by bubbling compressed air into it through porous or nonporous media. Nonporous diffusers of the nozzle, orifice, and valve type release larger bubbles than porous diffusers. The design of the blowers is based on the static head of the liquid above the diffusers and at the distribution losses. Plug-flow is desirable as it promtes efficient performance of the diffused air reaeration process. Variations from established plugflow, in some instances, could lower this efficiency.

Mechanical

Mechanical aeration for reaeration increases the dissolved oxygen content of the effluent stream by creating turbulence and constantly changing the air-water interface. The design of mechanical aerators for aeration is based on the power required to produce the needed standard oxygen transfer rate. The actual horsepower required varies with the flow characteristics assumed in the reaeration basin. Complete mixing is usually assumed as it will result in a design which assures adequate oxygen distribution. Mechanical aeration can be accomplished in chlorine contact chambers. This eliminates additional land requirements and the construction of separate reaeration tanks.

Disinfection

Chlorine:

Chlorine is perhaps the most commonly used chemical disinfectant. As it is added to the effluent, readily oxidizable substances and organic matter react with the chlorine, reducing most of it to the chloride ion. After meeting this immediate demand, the chlorine will continue to react with the ammonia to form chloramines. With continued addition of chlorine, essentially all of the chloramines will be oxidized. Continued addition of chlorine will result in a directly proportional increase in the free available chlorine.

Hypochlorite:

Hypochlorite salts have also been added to wastewater effluent for disinfection. Sodium hypochlorite and calcium hypochlorite are the most commonly used. Once the salt dissociates, the reactions that take place are the same as for disinfection with chlorine. The use of hypochlorite salts for disinfection has increased during the past few years as a result of shortages and price escalation of liquid chlorine.

Ozone:

Ozone is used in the disinfection of wastewater effluent. Ozone is applied by mixing ozonized air with the water being treated. Organic matter in water has an ozone demand that must be met before the excess becomes available for germicidal activity. Once this demand has been satisfied, bactericidal action is very rapid. The higher the concentration of ozone the more rapid the disinfection. Ozone does not persist as a residual bactericide, but rapidly breaks down in water to oxygen. Due to lack of residuals there is no certainty of completion of disinfection and there remains the possibility of potential contamination once the initial demand is met. Ozone purification also reduces odor problems.

DISPOSAL OF TREATMENT PLANT RESIDUALS

Wastewater treatment plants that provide for pollutant removals produce a significant quantity of residual material. This residual material or sludge is a semi-liquid waste which is normally processed to convert it to a suitable condition for disposal. Sludge disposal includes collection, transportation and final disposal. The purpose of this section is to set forth the quantity and characteristics of the sludge that will be produced in 1980 by those wastewater treatment plants that serve municipalities, individual public institutions and private housing developments.

The characteristics of sludge vary depending on its origin, the amount of aging that has taken place, and the type of processing to which it has been subjected. Sludge from primary sedimentation tanks is usually grey and slimy and, in most cases, has an extremely offensive odor. Sludge from chemical precepitation tanks is usually black and its odor is objectionable but not as bad as odor from primary sedimentation tanks. Waste - activated sludge generally has a brown flocculent appearance and when in good condition has an inoffensive characteristic odor. Waste - activated sludge has a tendency to become septic rapidly and then has a disagreeable odor of putrefaction. Trickling filter sludge, usually known as humus, is brownish, flocculent, and relatively inoffensive when fresh. It generally undergoes decomposition more slowly than other undigested sludges. Sludge from septic tanks is black and, unless well digested by long storage, is offensive due to the hydrogen sulphide and other gases it gives off. Digested sludge is dark brown or black and when thoroughly digested, it is not offensive

Exhibit 4.1t - Segment, Classification and Priority - Licking River Basin

Segment No.	Classification	Priority
1	EL	180.7
2	EL	178.2
3	WQL	813.1
4	WQL	118.7
5	WQL	102.0
6	EL	102.2
7	WQL	107.9
8	WQL	130.9
9	WQL	130.6
10	WQL	113.8
11	EL	109.5
12	WQL	106.0
13	EL	100.6
14	WQL	496.2
15	EL	104.0
16	WQL	1,738.0
17	WQL	316.3
18	EL	103.5
19	WQL	147.4
20	WQL	2,153.2
21	EL	101.6
22	WQL	126.2
23	WQL	106.1
24	WQL	102.4
25	WQL	101.1
26	EL	102.8
27	WQL	105.2
28	WQL	345.7
29	WQL	264.9
30	WQL	102.0
31	WQL	109.1
32	WQL	592.4
33	WQL	105.6
34	WQL	108.5
35	WQL	719.2
36	WQL	215.8
37	WQL	136.7
38	EL	102.6
39	EL	101.6
40	WQL	141.7

Exhibit 4.3t - Significant Municipal Discharges - Licking River Basin

Discharge Name	Location Segment	Location County	Receiving Water	Water Quality Violation	1975 Abatement Priority	NPDES Permit Number	NPDES Permit Expiration Date	NPDES Permit Compliance Schedule
Elsmere STP	3	Kenton	Bullock Pen Cr. - Banklick Cr. - Licking River 511.2/4.6/6.8/3.8	BOD,TSS,NH3	2121.4	0020991	6-30-77	Yes
Butler STP	2	Pendleton	Licking River 511.2/34.8	BOD,TSS	21.6	0021041	6-30-77	Yes
Falmouth STP	2	Pendleton	Licking River 511.2/51.6	NH3	0	0021482	6-30-77	Yes
Cynthiana STP	14	Harrison	S. Fork Licking - Licking River 511.2/51.7/48.6	BOD,TSS	614.1	0023370	6-30-77	Yes
Carlisle STP	16	Nicholas	Brushy Fk. - Big Brushy Cr. - Hinkston Cr. - Licking River 511.2/51.7/81.0/4.7/2.43	BOD,TSS,NH3	253.9	0020923	6-30-77	Yes
Mt. Sterling STP	16	Montgomery	Hinkston Cr. - Licking River 511.2/51.7/131.0	BOD,TSS,NH3	3444.4	N.I.	-------	---
Paris STP	17	Bourbon	Stoner Cr. - S. Fk. Licking River 511.2/51.7/65.1/15.0	BOD,TSS	251.0	0021059	6-30-77	Yes
North Middletown STP	19	Bourbon	Indian Cr. - Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/65.1/35.4/0.6	BOD,TSS,NH3	182.0	N.I.	-------	---
Winchester Town Branch STP	20	Clark	UT - Strodes Cr. - Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/65.1/29.85/ 22.1/2.6	BOD,TSS,NH3	5769.5	0020052	6-30-77	Yes
Winchester Strodes Cr. STP	20	Clark	Strodes Cr. - Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/65.1/29.85/22.1	NONE	0	N.I.	-------	---
Flemingsburg STP	29	Fleming	Town Br. - Fleming Cr. - Licking River 511.2/106.92/25.9/0.4	BOD,TSS,NH3	424.6	0021229	6-30-77	Yes
Owingsville STP	32	Bath	Dry Br. - Slate Cr. - Licking River 511.2/144.4/11.85/1.45	BOD,TSS,NH3	422.9	0024287	6-30-77	Yes
Morehead STP	35	Rowan	Triplett Cr. - Licking River 511.2/168.5/12.1	BOD,TSS,NH3	1504.6	0020729	6-30-77	Yes
West Liberty STP	36	Morgan	Licking River 511.2/225.7	BOD,TSS,NH3	308.0	0023175	6-30-77	Yes
Frenchburg STP	37	Menifee	Beaver Cr. - Licking River 511.2/188.0/14.5	BOD,TSS,NH3	165.2	N.I.	-------	---
Salyersville STP	40	Magoffin	Licking River 511.2/269.7	BOD,TSS,NH3	87.1	0026867	6-30-77	Yes

N.I. = Not Issued

Exhibit 4.5t - Significant Domestic Discharges - Licking River Basin

Discharge Name	Location Segment	Location County	Receiving Water	Water Quality Violation	NPDES Permit Owner	NPDES Permit Number	NPDES Permit Expiration Date	NPDES Permit Compliance Schedule
Summit Hills Heights	3	Kenton	UT - Banklick Cr. - Licking River 511.2/4.6/4.2/0.3	BOD,TSS,NH_3	-----	N.I.	-------	---
Lakeside East Apts.	3	Kenton	UT - Horse Br. - Banklick Cr. - Licking River 511.2/4.6/3.9/1.0/1.1	BOD,TSS,NH_3	-----	N.I.	-------	---
Verna Hills Subdivision	20	Clark	UT - Hancock Cr. - Strodes Cr. - Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/65.1/29.85/ 20.5/6.9/1.45	BOD,NH_3	-----	N.I.	-------	---
Oak Haven Subdivision	22	Pendleton	UT - Blanket Cr. - Licking River 511.2/55.6/4.64/0.2	BOD,TSS,NH_3	-----	N.I.	-------	---

N.I. = Not Issued

LICKING RIVER BASIN

EXHIBIT 4.4m

SIGNIFICANT POINT DISCHARGES

LEGEND

x 50 RIVER MILES

DOMESTIC DISCHARGERS

D 2 MAJOR (OVER 1 MGD)

D 7 PRINCIPAL (LESS THAN 1 MGD)

INDUSTRIAL DISCHARGERS

I 23 MAJOR (OVER 1 MGD)

I 6 PRINCIPAL (LESS THAN 1 MGD)

MUNICIPAL DISCHARGERS

M 4 MAJOR (OVER 1 MGD)

M 9 PRINCIPAL (LESS THAN 1 MGD)

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

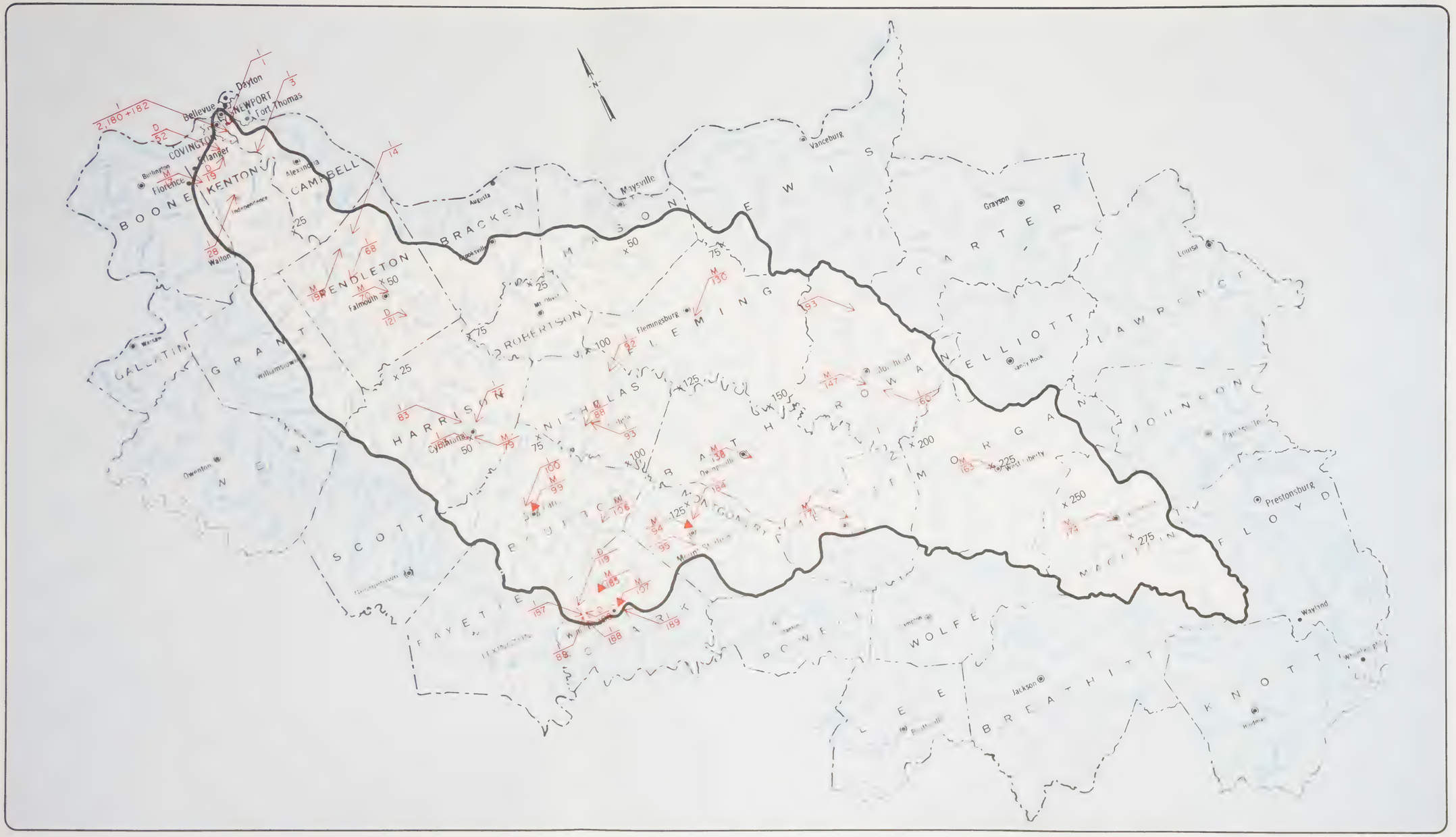
KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PROCTOR-DAVIS-RAY
Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.



LICKING RIVER BASIN

EXHIBIT 4.4m

SIGNIFICANT POINT DISCHARGES

LEGEND

× 50 RIVER MILES

DOMESTIC DISCHARGERS

MAJOR (OVER 1 MGD)

PRINCIPAL (LESS THAN 1 MGD)

INDUSTRIAL DISCHARGERS

MAJOR (OVER 1 MGD)

PRINCIPAL (LESS THAN 1 MGD)

MUNICIPAL DISCHARGERS

MAJOR (OVER 1 MGD)

PRINCIPAL (LESS THAN 1 MGD)

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U.S. Geological Survey

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Lexington, Kentucky

w. e. gates and associates inc.
Cincinnati, Ohio Washington D.C.

Exhibit 4.7t - Significant Industrial Discharges - Licking River Basin

Discharge Name	Location		Receiving Water	Water Quality Violation	Principal SIC Code	NPDES Permit			
	Segment	County				Owner	Number	Expiration Date	Compliance Schedule
N. KY Asphalt	1	Kenton	Licking River 511.2/1.5	NONE	N.A.	N. KY Asphalt	0001651	9-30-78	Yes
Interlake Steel	1	Campbell	Licking River 511.2/2.0	BOD,TSS	33	Interlake Inc.	0002712	6-27-79	No
L & N Railroad	2	Kenton	Licking River 511.2/8.0	NH_3	37	L & N Railroad Co.	0003131	9-30-78	Yes
Geohegan & Mathias	2	Pendleton	Flour Cr. - Licking River 511.2/37.1/0.3	NONE	N.A.	Geohegan & Mathias	0001503	9-30-78	No
New Frontier Corp.	3	Kenton	UT - Brushy Fk. - Banklick Cr. - Licking River 511.2/4.6/11.0/ 1.7/0.3/0.3	BOD,TSS, NH_3	N.A.	---	N.I.	---	---
Griffin Fertilizer	9	Pendleton	UT - UT - S. Fk. Grassy Cr. - Licking River 511.2/30.6/6.2/ 1.0/0.7	BOD,TSS NH_3	28	---	N.I.	---	---
Best Tool & Die	14	Harrison	S. Fk. Licking - Licking River 511.2/51.7/45.65	BOD,TSS	34	---	N.I.	---	---
Webber Sausage Co.	14	Harrison	S. Fk. Licking - Licking River 511.2/51.7/42.85	BOD,TSS	20	Webber Sausage Co.	0001627	2-13-80	No
Nicholas Dog Meat Co.	28	Nicholas	UT - Mint Cr. - Licking River 511.2/103.1/ 1.83/0.35	BOD,TSS, NH_3	20	---	N.I.	---	---
Bluegrass Knitting	16	Nicholas	UT - Brushy Fk. - Hinkston Cr. - Licking River 511.2/51.7/81.0/ 4.7/2.6/0.2	BOD,TSS, NH_3	22	Bluegrass Knitting Inc.	0002445	2-13-80	Yes
Hobart Industries	16	Mont-gomery	Hinkston Cr. - Licking River 511.2/51.7/133.5	NONE	36	Hobart Mfg. Co.	0001201	2-13-80	No
Bourbon Packing Co.	17	Bourbon	Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/ 65.1/14.04	BOD,TSS	20	Bourbon Packing Co.	0001635	2-13-80	Yes
Rockwell Inter-national	20	Clark	UT - Hancock Cr-Strodes Cr-Stoner Cr-S.Fk. Licking Licking River 511.2/51.7/65.1/ 29.85/20.5/4.35/ 0.3	NONE	37	---	N.I.	---	---
East KY Paving Co.	35	Rowan	Morgan Fk. - Dry Cr. - Triplett Cr. - Licking River 511.2/168.5/ 12.3/0.5/2.2	BOD,TSS, NH_3	N.A.	---	N.I.	---	---
Interlake Steel	1	Campbell	Licking River 511.2/2.0	NONE	33	Interlake Inc.	0002712	6-27-79	Yes
Interlake Steel	1	Campbell	Licking River 511.2/2.0	NONE	33	Interlake Inc.	0002712	6-27-79	Yes
Landish Co.	14	Harrison	S. Fk. Licking - Licking River - 511.2/51.7/49.4	NONE	34	Landish Co. KY Div.	0001741	6-21-79	Yes
A.O. Smith	16	Mont-gomery	Hinkston Cr. - Licking River 511.2/51.7/130.6	NONE	36	---	N.I.	---	---

Exhibit 4.7t - Significant Industrial Discharges - Licking River Basin

Discharge Name	Location		Receiving Water	Water Quality Violation	Principal SIC Code	NPDES Permit			
	Segment	County				Owner	Number	Expiration Date	Compliance Schedule
Rockwell International	20	Clark	UT - Hancock Cr. Strodes Cr. - Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/65.1/ 29.85/20.5/4.35/ 0.5	NONE	37	---	N.I.	---	---
Rockwell International	20	Clark	UT - Hancock Cr. Strodes Cr. - Stoner Cr. - S. Fk. Licking - Licking River 511.2/51.7/65.1/ 29.85/20.5/4.35/ 0.4	BOD,TSS	37	---	N.I.	---	---
GTE Sylvania	20	Clark	UT - UT - Strodes Cr. - Stoner Cr. S. Fk. Licking - Licking River 511.2/51.7/65.1/ 29.85/22.1/2.0/ 1.8	NONE	36	GTE Sylvania Inc.	0002615	6-28-79	Yes
Pleasant Valley Packing	32	Mont-gomergy	UT - Lower Spruce Cr. - Spruce Cr. Slate Cr. - Licking River 511.2/144.5/53.8/ 1.6/0.75/0.25	N.A.	20	---	N.I.	---	---
TN Gas Trans-mission	35	Rowan	N. Fk. Triplett Triplett Cr. - Licking River 511.2/168.5/5.8/ 15.7	NONE	46	TN Gas Trans-mission	0001490	9-30-78	Yes

N.I. = Not Issued
N.A. = Not Available

Exhibit 4.9t - Solid Waste Disposal Sites - Licking River Basin

Number	Type	Location		
		County	Segment	Receiving Stream
006.01	Unpermitted Dump	Bath	34	Mud Lick Creek
009.01	Closed Dump	Bourbon	17	Stoner Creek
009.02	Unpermitted Dump	Bourbon	17	Houston Creek
009.04	Unpermitted Dump	Bourbon	16	Hinkston Creek
009.05	Unpermitted Dump	Bourbon	16	Somerset Creek
012.03	Closed Dump	Bracken	23	Camp Creek
012.04	Closed Dump	Bracken	23	North Fork Licking River
019.08	Sanitary Landfill	Campbell	2	Licking River
025.03	Unpermitted Dump	Clark	20	Strodes Creek
035.01	Unpermitted Dump	Fleming	29	Fleming Creek
035.02	Unpermitted Dump	Fleming	29	Fleming Creek
035.03	Sanitary Landfill	Fleming	30	South Lick Branch
035.04	Nuclear Waste Landfill	Fleming	31	Rocklick Creek
041.02	Sanitary Landfill	Grant	12	Coopertown Creek
041.03	Closed Dump	Grant	13	South Fork Licking River
049.01	Sanitary Landfill	Harrison	14	Grays Run
049.02	Closed Dump	Harrison	15	South Fork Licking River
059.01	Sanitary Landfill	Kenton	3	Licking River
059.03	Closed Dump	Kenton	6	Bowman Creek
059.05	Sanitary Landfill	Kenton	3	Banklick Creek
059.05A	Closed Dump	Kenton	3	Banklick Creek
059.06	Closed Dump	Kenton	3	Banklick Creek
077.02	Closed Dump	Magoffin	40	Left Middle Fork
077.03	Closed Dump	Magoffin	40	Licking River
077.05	Closed Dump	Magoffin	40	Burning Fork
077.06	Closed Dump	Magoffin	40	Mason Creek
077.07	Closed Dump	Magoffin	36	Licking River
077.08	Closed Dump	Magoffin	40	Bear Branch
077.09	Closed Dump	Magoffin	40	Trace Fork
077.10	Closed Dump	Magoffin	40	Licking River
077.11	Closed Dump	Magoffin	36	Licking River
077.12A	Closed Dump	Magoffin	40	Mason Fork
077.12B	Closed Dump	Magoffin	40	Mason Fork
077.13	Closed Dump	Magoffin	40	Howard Branch
077.14	Closed Dump	Magoffin	40	Licking River

Exhibit 4.9t - Solid Waste Disposal Sites - Licking River Basin

Number	Type	Location		
		County	Segment	Receiving Stream
077.15	Closed Dump	Magoffin	40	Burning Fork
077.16	Closed Dump	Magoffin	40	Left Middle Fork
077.17	Closed Dump	Magoffin	40	Salt Lick Branch
077.19	Closed Dump	Magoffin	40	Mason Fork
077.20	Closed Dump	Magoffin	40	Mason Fork
077.21	Closed Dump	Magoffin	40	Licking River
087.01	Sanitary Landfill	Montgomery	32	Harpers Creek
087.02	Unpermitted Dump	Montgomery	32	Slate Creek
088.01	Unpermitted Dump	Morgan	39	Lick Fork
088.02	Unpermitted Dump	Morgan	36	Caney Creek
091.01	Sanitary Landfill	Nicholas	16	Big Brushy Creek
091.02	Closed Dump	Nicholas	28	Licking River
091.03	Closed Dump	Nicholas	16	Big Brushy Creek
096.01	Sanitary Landfill	Pendleton	9	South Fork Grassy Creek
096.02	Closed Dump	Pendleton	2	South Fork Licking River
101.01	Closed Dump	Robertson	28	Cedar Creek
101.02	Closed Dump	Robertson	28	Licking River
103.01	Unpermitted Dump	Rowan	35	North Fork
103.02	Sanitary Landfill	Rowan	35	Triplett Creek
103.03	Closed Dump	Rowan	35	North Fork
103.04	Closed Dump	Rowan	36	Cave Run Lake
103.05	Closed Dump	Rowan	35	Seas Branch
103.06	Closed Dump	Rowan	35	Triplett Creek
103.07	Sanitary Landfill	Rowan	28	Licking River

LICKING RIVER BASIN

EXHIBIT 4.10m

SIGNIFICANT NON-POINT SOURCES

LEGEND

x 50 RIVER MILES

CS CITIES WITH COMBINES SEWERS

RAW SEWAGE SEPTIC TANK DRAINAGE

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

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PDR

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LICKING RIVER BASIN

EXHIBIT 4.10m

SIGNIFICANT NON-POINT SOURCES

LEGEND

× 50 RIVER MILES

CS CITIES WITH COMBINES SEWERS

RAW SEWAGE SEPTIC TANK DRAINAGE

5 0 10 20

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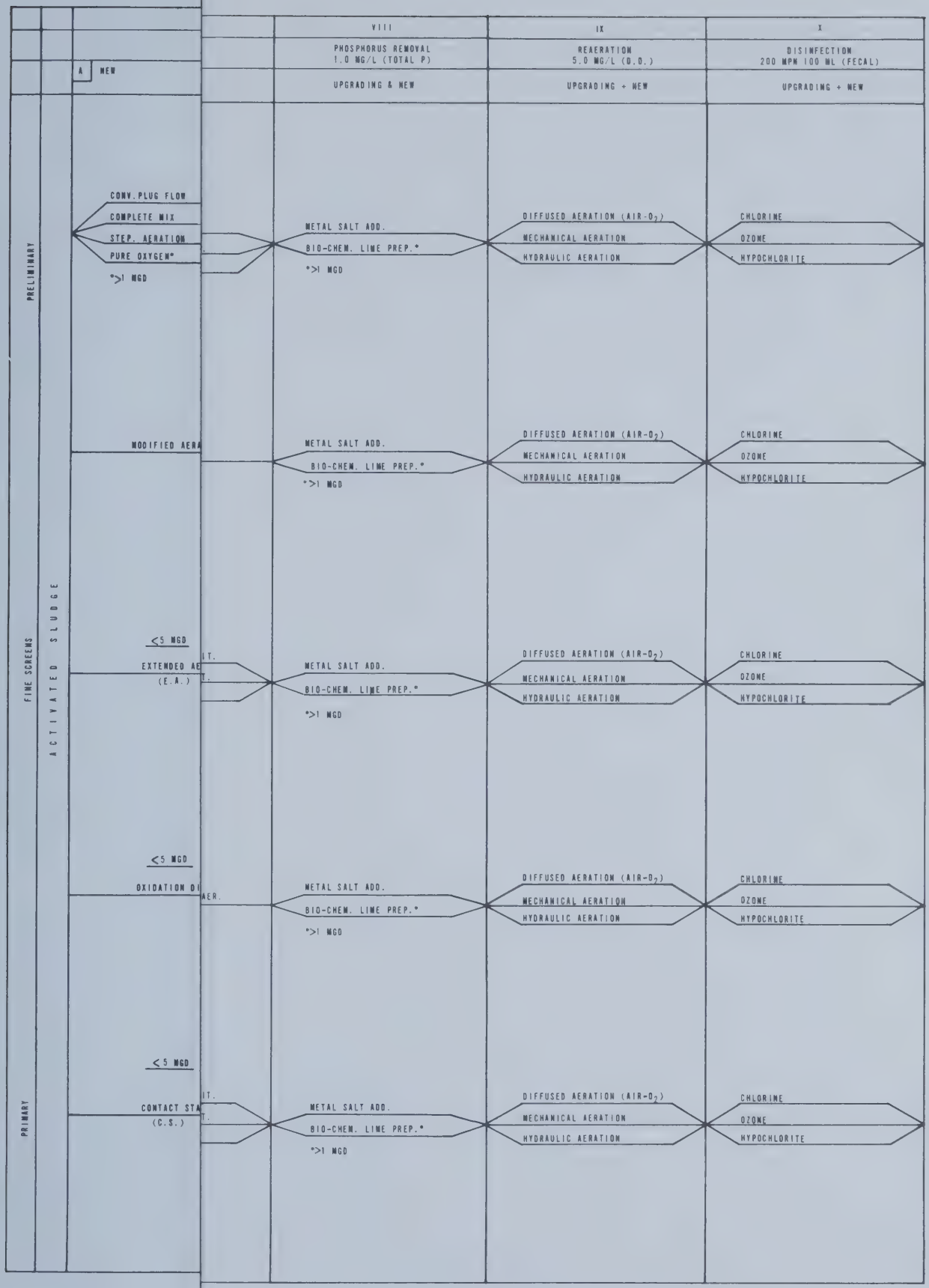


EXHIBIT 4.11t-A
WASTEWATER TREATMENT SYSTEMS
FOR ACTIVATED SLUDGE OPTIONS

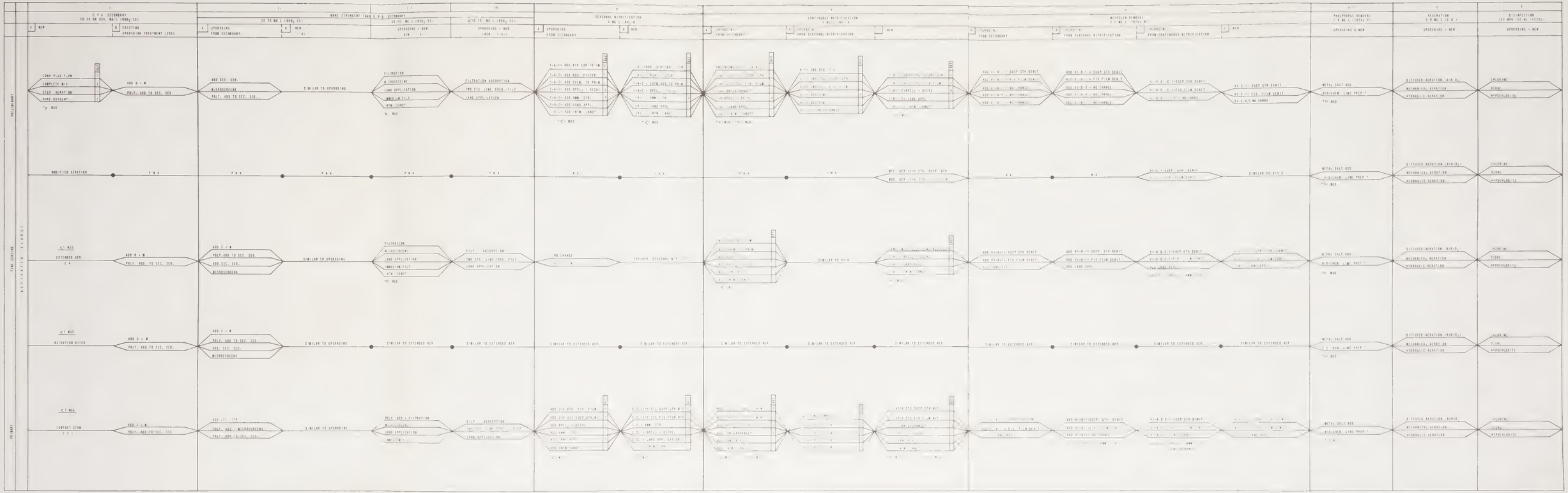


EXHIBIT 4.11t-A
WASTEWATER TREATMENT SYSTEMS
FOR ACTIVATED SLUDGE OPTIONS

METCALF & EDDY

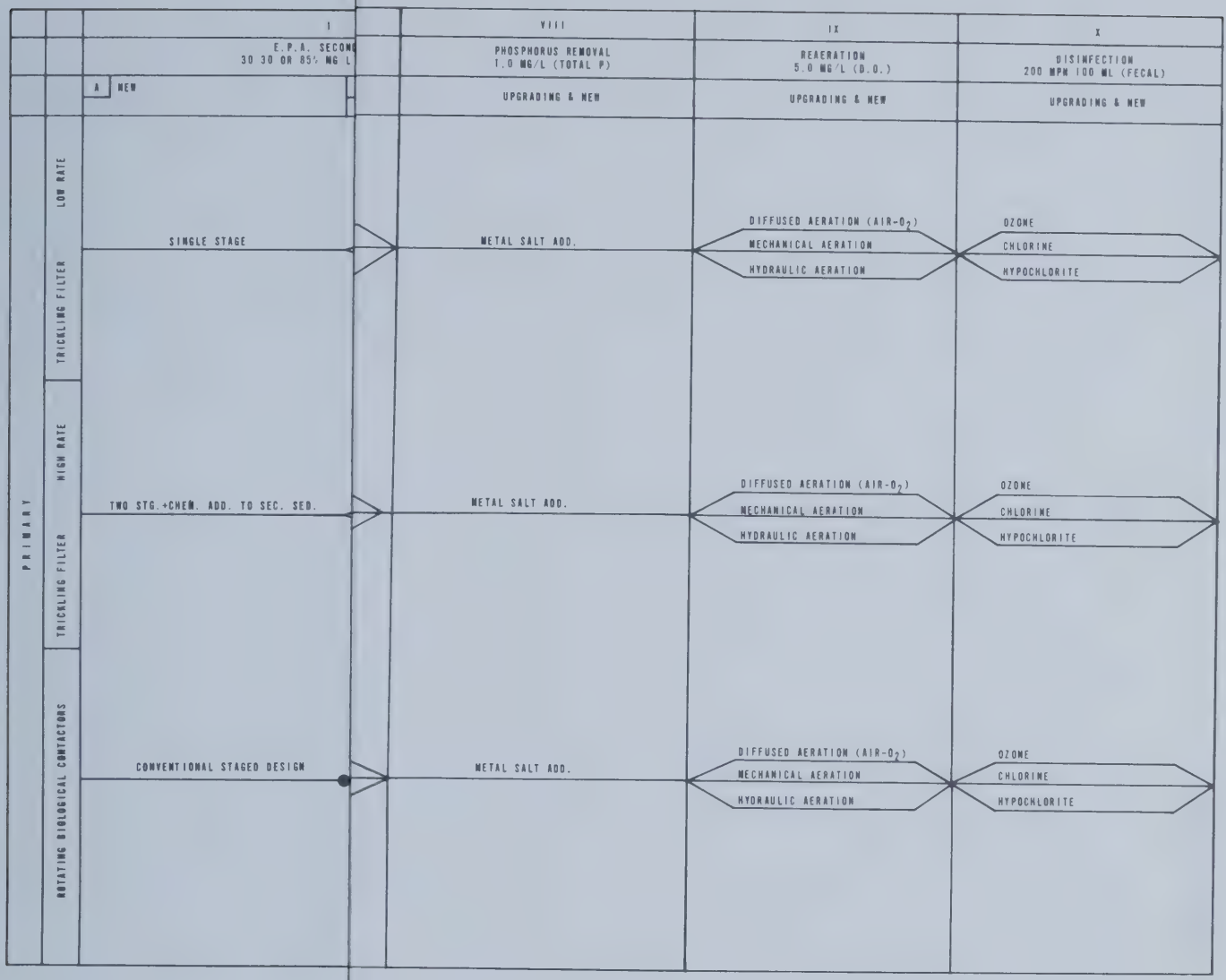


EXHIBIT 4.11t-B
WASTEWATER TREATMENT SYSTEMS
FOR FIXED FILM OPTIONS

METCALF & EDDY

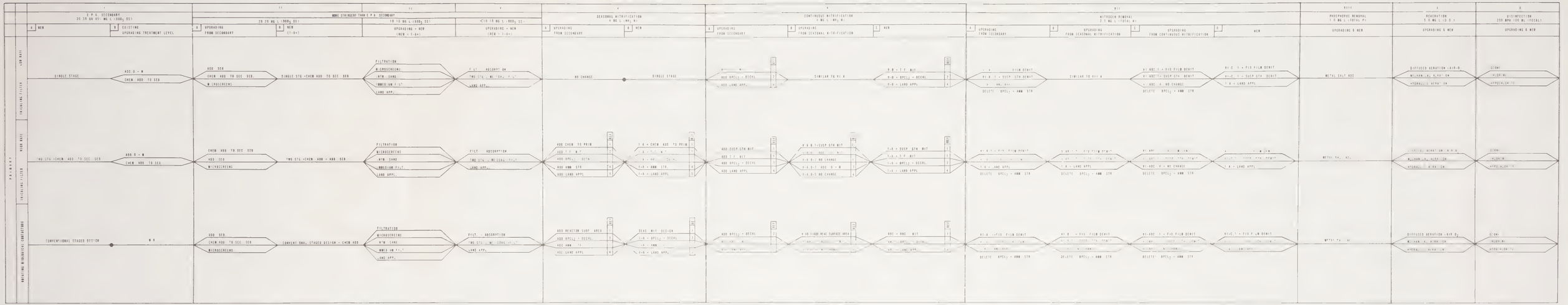


EXHIBIT 4.11t-B
WASTEWATER TREATMENT SYSTEMS
FOR FIXED FILM OPTIONS

METCALF & EDDY

E.P.A. SECONDA
30 30 OR 85% MG L
A
NEW
B
PRELIMINARY
LAGOONS
AERATED POND
OXIDATION PONDS
AERATED LAGOON + SEDIMENTATION
LOW RATE STAB. LAGOON (L.R.S.)
INTERMITTENT DISCHARGE LAGOON

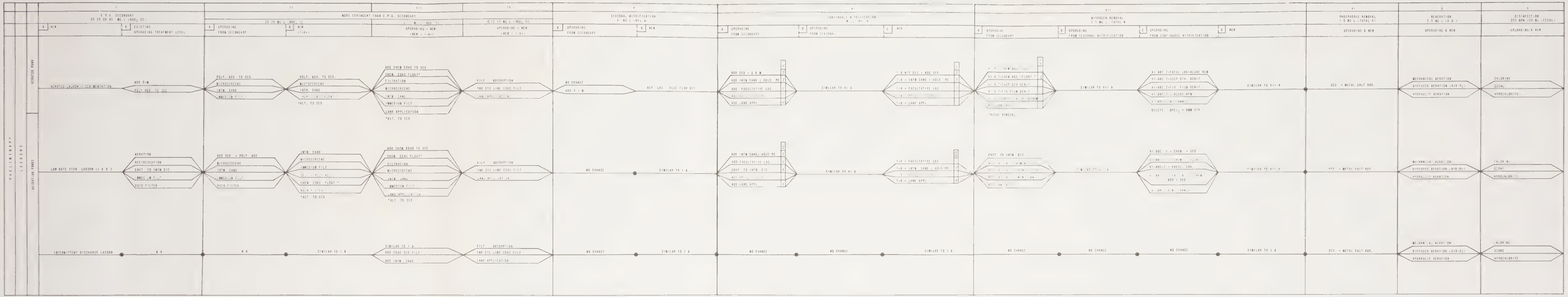
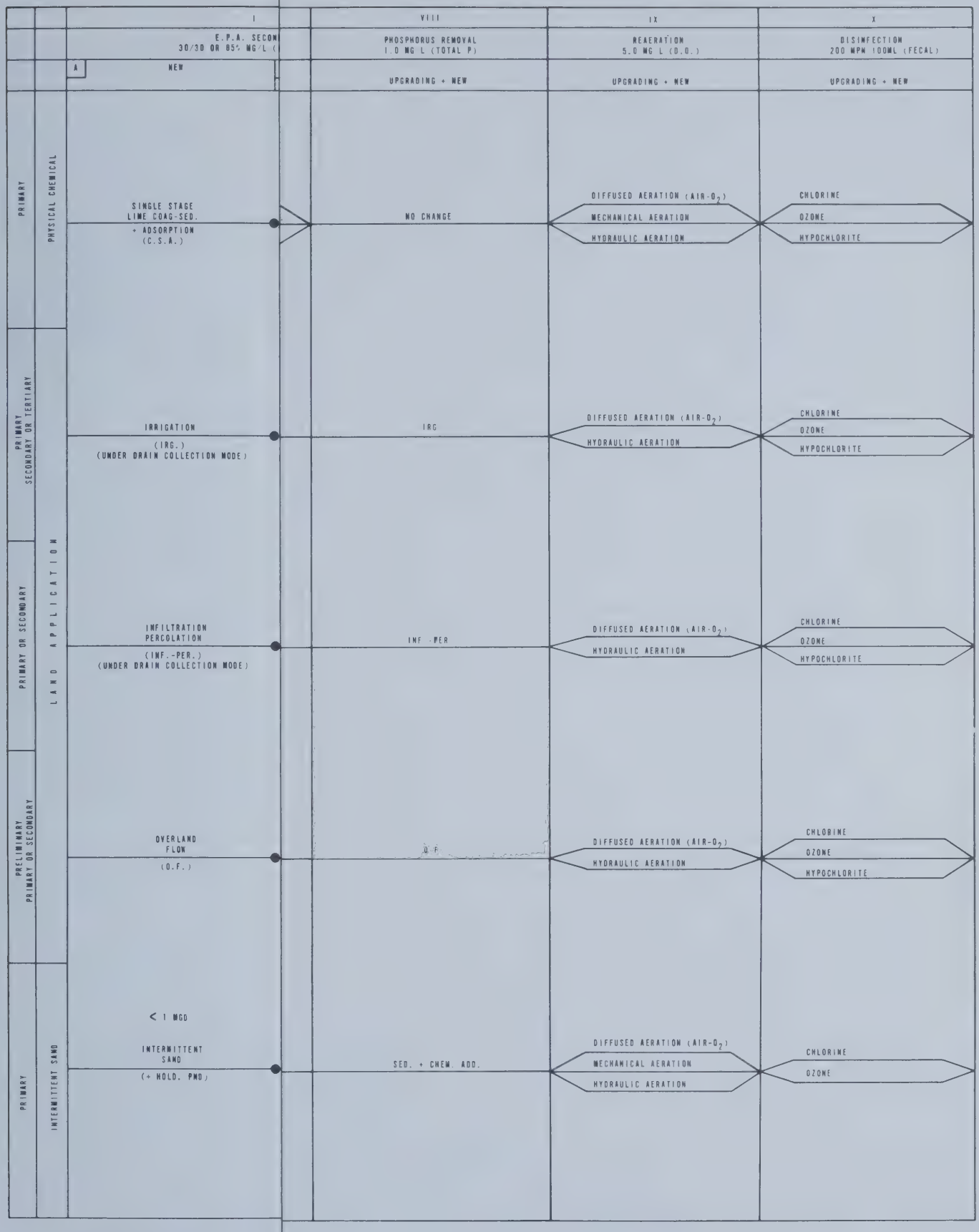


EXHIBIT 4.11t-C
WASTEWATER TREATMENT SYSTEMS
FOR LAGOON AND POND OPTIONS

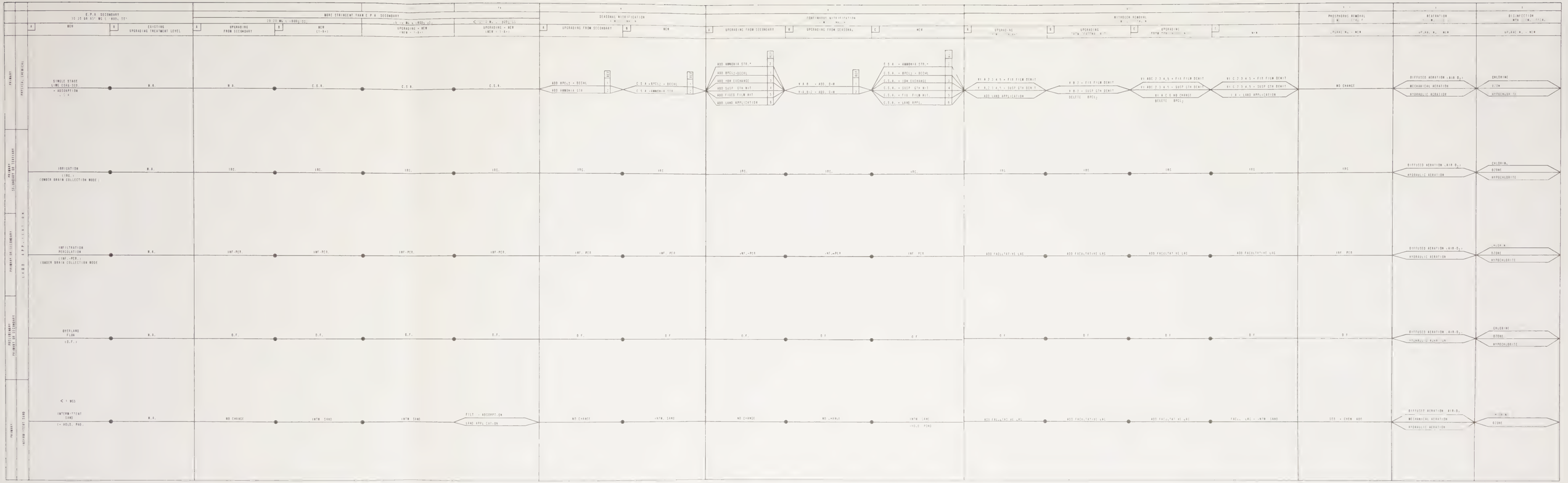
METCALF & EDDY



*PROCESS APPLICATION TO COLD WEATHER DES
BASED ON pH CONTROL CHEMICAL COST SAVIN
PRECIPITATION PROCESS.

EXHIBIT 4.11t-D
WASTEWATER TREATMENT SYSTEMS FOR PHYSICAL-CHEMICAL AND LAND APPLICATION OPTIONS

METCALF & EDDY



*PROCESS APPLICATION TO COLD WEATHER DESIGN CONSIDERATIONS MAY BE ECONOMICAL BASED ON ICE CONTROL CHEMICAL COST SAVINGS ATTRIBUTABLE TO CHEMICAL PRECIPITATION PROCESS

EXHIBIT 4.11t-D
WASTEWATER TREATMENT SYSTEMS
FOR PHYSICAL-CHEMICAL AND
LAND APPLICATION OPTIONS

METCALF & EDDY

Exhibit 4.12t - Projected Sludge Disposal Needs of Significant Dischargers in 1980 - Licking River Basin

County	Discharger	Population (1980)	Treatment System		Sludge Generation		
			Process Train	Flow (mgd)	Factor #/day/mgd	#/day	Cubic Ft/day
Campbell		N.A.					5
	Interlake, Inc.	N.A.	E.A.	0.077	1200	92.4	4.94
Kenton		10,300					86
	Northern KY Asphalt	N.A.	Oil Separation & Sedimen.	0.055	----	-------	------
	L & N Railroad	N.A.	Oil Separation & Sedimen.	0.010	----	-------	------
	New Frontier Corp.	N.A.	E.A.	0.036	1200	43.2	2.31
	Summit Hills Hgts.	500	E.A.	0.054	1200	64.8	3.46
	Lakeside East Apts.	800	A.S.	0.080	1225	98.0	5.24
	City of Elsmere	9,000	A.S. + Nit. + Filt. + Dig.	1.0	1400	1,400.0	74.79
Pendleton		3,560					24
	Geohegan & Mathias	N.A.	Sedimentation	0.230	----	-------	------
	Griffin Fertilizer	N.A.	Lagoon	0.050	----	-------	------
	Oak Haven Subdivision	450	E.A.	0.045	1200	54.0	2.88
	City of Butler	460	E.A.	0.060	1200	72.0	3.85
	City of Falmouth	2,650	A.S. + Dig.	0.290	1225	330.8	17.67
Harrison		7,300					75
	Best Tool & Die	N.A.	E.A.	0.005	1200	6.0	0.32
	Webber Sausage Co.	N.A.	E.A.	0.020	1200	24.0	1.28
	City of Cynthiana	7,300	A.S. + Dig.	1.12	1225	1,372.0	73.29
Nicholas		1,700					21
	Nicholas Dog Meat	N.A.	Lagoon	0.002	----	-------	------
	Bluegrass Knitting	N.A.	Aer. Lagoon + Clarifier	0.100	1200	120.0	6.41
	City of Carlisle	1,700	T.F. + Nit. + Filt. + Dig.	0.20	1365	273.0	14.58
Montgomery		9,040					125
	City of Mt. Sterling	8,400	1.3T.F./0.3A.S. + Nit. + Filt. + Dig.	1.6	1400	2,240.0	119.66
	Mont. Co. San. Dist. #2	640	A.S. + Nit. + Filt. + Dig.	0.065	1400	91.0	4.86
Bourbon		9,650					85
	Bourbon Packing	N.A.	Sedimen. + E.A.	0.018	2200	39.6	2.12
	City of Paris	8,400	T.F. + Filt. + Dig.	1.0	1365	1,365.0	72.92
	City of No. Middletown	400	A.S. + Nit. + Filt. + Dig.	0.05	1400	70.0	3.74
	City of Millersburg	850	A.S. + Dig.	0.10	1225	122.5	6.54
Clark		1,800					186
	Verna Hills Subdivision	500	E.A. + Lagoon	0.050	1200	60.0	3.21
	Rockwell International	N.A.	S.F. + Lagoon	0.012	----	-------	------
	City of Winchester	1,300	T.F. + Nit. + Filt. + Dig.	2.5	1365	3,412.5	182.29
Fleming		2,510					18
	City of Flemingsburg	2,510	T.F. + Nit. + Filt. + Dig.	0.25	1365	341.0	18.23
Bath		2,560					19
	City of Owingsville	1,700	T.F. + Nit. + Filt. + Dig.	0.18	1365	245.7	13.13
	Bath Co. Water Dist. #2	860	A.S. + Dig.	0.090	1225	110.3	5.89
Robertson		250					2
	Mt. Olivet	250	A.S. + Nit. + Filt. + Dig.	0.025	1400	35.0	1.87
Rowan		10,000					73
	East KY Paving Co.	N.A.	Lagoon	0.018	----	------	-----
	City of Morehead	10,000	T.F. + Nit. + Filt. + Dig.	1.0	1375	1375	73.45
Morgan		1,000					7
	West Liberty	1,000	T.F. + Nit. + Filt. + Dig.	0.10	1365	136.5	7.29
Menifee		400					4
	Frenchburg	400	E.A. + Nit. + Filt.	0.050	1450	72.5	3.87
Magoffin		600					6
	Salyersville	600	E.A. + Nit. + Filt.	0.080	1450	116.0	6.20

N.A. = Not Applicable

Chapter V

BASINWIDE MANAGEMENT PLAN

The preceding chapters in this report are devoted to presentations and considerations of the various elements and factors which need to be considered in the formulation of a water quality management plan as mandated by the 303(e) Planning process. The character of the planning process and the larger legislative framework of which it is a part, as well as the techniques used for the planning process are discussed in prior portions of this report. The physical environment for water quality management in the Basin, and the social and economic forces in conjunction with the hydrologic character of the Basin, give rise to the stresses in the aquatic environment as delineated and characterized in preceding chapters; as are those issues relating most directly to water quality and water pollution control management. The material presented in this Chapter is intended to describe what constitutes a rational, reasonable, and implementable water quality and water pollution control management plan for the Basin.

INTRODUCTION

It is perhaps axiomatic that the character and sophistication of a planning problem will be expanded and synthesized until they are equal to the character and sophistication of the specifications and tools available to the planner. The temptation to make the problem fit the cure should be rejected in general, and most specifically in the case of 303(e) Planning. It does not seem inappropriate to recognize that many water quality management problems in the United States are not up to the level of sophistication and complexity envisioned in PL 92-500. Further, it cannot be expected that national norms are equally applicable to all aspects of any problem area regardless of where in a tremendously wide diversity of social, economic, environmental, and political settings a given problem within a problem area may occur. It is not intended to imply by the preceding that water quality problems do not exist in the Basin or that the water quality problems should not be addressed; however, by the preceding, it is intended to imply that although some aspects of the water quality problems in the Basin are common to many other water quality problems in other locations, it must be recognized that other aspects of the Basin's water quality problems are inherently unique to the Basin. Both of the preceding aspects of the Basin's water quality management problems are due diffidence in formulating a water quality management plan for the Basin, particularly within the context of a continuing planning process such as 303(e) Planning.

In appreciation of the above, the emphasis in formulation of a water quality management plan for the Basin has been about equally distributed between implementing the tools necessary to support a continuing planning process and addressing the immediate water quality problems which need to be resolved. No attempt has been made to obviate the fact that there is currently insufficient documenting information relative to water quality management problems in the Basin to justify a highly sophisticated planning output. However, it must be noted that through the use of ADAPT, the opportunity has been created to readily improve and update the water quality management and water quality management planning function for the Basin as the data base is improved/updated, and as circumstances change either generally within the Basin or at specific locations in the Basin. Also, ADAPT provides the opportunity to extend the purview of the planning and management functions, particularly in the areas of planning design and costing for the examination of the consequence of alternative approaches to water quality management, and in the area of integrating the land based and water based aspects of 303(e) Planning in the Basin into one single computer based planning system.

For the present cycle of the 303(e) Planning process, the emphasis has been on the point source aspects of water quality management for the Basin. Other facets of water quality management for the Basin were considered, however, until and/or unless the quality of many of the point source discharges is improved, the other aspects of water quality management in the Basin will remain of lesser importance to achieving desired water quality goals. Thus, if the implementation programs for correcting the point source problems can be initiated in the near future, a process which will require federal financial assistance for the municipal point discharges, then subsequent 303(e) Planning efforts can productively increase the emphasis on bringing other elements of the water quality problems in the Basin under management control.

APPROACH TO BASINWIDE MANAGEMENT PLAN DEVELOPMENT

The development of the water quality management plan for the Basin was comprised of two major efforts which were carried out, more or less, in parallel for the greater portion of this 303(e) Planning cycle, with the results of the two efforts being joined to provide the overall plan. One area of major effort involved the land based data, the calibration of ADAPT to the Basin, the development of the ADAPT data base, delineation of stream networks for incorporation into ADAPT, the use of ADAPT to estimate erosion rates, the ADAPT production of the various data compilations required for this report, the description and characterization of existing waste discharges and treatment facilities, and the development of priorities for water quality management segments and significant discharges. The other area of major effort was concerned with water quality modeling including stream hydrologies assessing the impact of waste discharges on stream quality, determining waste load allocations, and specifying alternative treatment processes and effluent qualities for point discharges.

The activities associated with the first of the above areas of major effort were primarily the responsibility of the consultant; and the activities associated with the second of the above areas of major effort were primarily the responsibility of personnel from the University of Kentucky and the University of Louisville.

Contextual Framework for Approach

As discussed in Chapter I, the organizing concept for water quality management programs resulting from the 303(e) Planning process is the water quality management segment. The organizing concept is further refined in terms of whether a water quality management segment is effluent limited or water quality limited. Minimum acceptable levels of treatment will insure that the water quality in an effluent limited segment meets or exceeds water quality standards. Treatment in excess of the minimum acceptable is required to insure that the water quality in water quality limited segments meets water quality standards. Thus, water quality limited segments create the more demanding water quality management problems. The treatment of discharges to effluent limited segments is not of lesser importance; however, the water quality management for effluent limited segments does not involve waste load allocations, and all the potential social, economic, political, and environmental implications thereof.

Because, as discussed in Chapter I, there are no unique, prespecified criteria which can be used to delineate either water quality management segments or allocate the available waste carrying capacity of water quality limited segments, the delineation of water quality limited segments and the allocation of the waste carrying capacity should be based on the social, economic, and political objectives, and realities of the basin and the segment. The greater the intensity of social and economic development and the greater the intensity of the use of the water resource within a basin or segment, the more crucial are the issues of water quality limited segment definition and waste carrying capacity allocation within a segment. When social and economic development is limited and resource use is low water quality management at the Basin level and segment level inevitably drops to being comprised of individual consideration of discrete discharges/dischargers within an overall desired water quality framework. The existence of basinwide activities such as mining or the need to consider runoff as a pollutant source can provide a basinwide cohesiveness to a water quality management program even though social and economic development and water resource use are not sufficient to create cohesiveness.

At present, the Licking River Basin does not have sufficient social and economic development or water resource use to justify a sophisticated, comprehensive, all encompassing water quality management program. The existing need is for a water quality management program which can deal expeditiously with discrete existing problems, which can acquire and process data/information so as to anticipate and preclude future problems, and whose capacity and sophistication to support management and planning functions can be expanded and enhanced in a continuum. As the development of the coal resources in the Basin expands, and as the technology for assessing and dealing with pollutants derived from runoff increases, a comprehensive, integrated Basinwide water quality management program will be mandatory.

Land Based Data Approach

The procedures used for the acquisition, management and manipulation of the land based data are described in Chapters III and IV. The existing and projected populations were distributed according to rural, and urban categories utilizing the ADAPT system. Employment and housing distributions were tied to the existing and projected population distributions. Land use data was obtained and codified in the ADAPT system according to the following categories; urban, rural, mining, agriculture, silviculture, and water. Also, land was codified as to its location according to the following categories; enumeration districts, existing sewer service areas, Intensive 201 Planning areas, Outer 201 Planning areas, county, incorporated area, water quality management segment, and ADD. Soils information and topography were also incorporated into the ADAPT data base. Thus, population data, and employment and housing data because of their tie to population data, were assigned to land areas, and the land areas were codified in as many different ways as deemed necessary for water quality management planning needs. Thus, all the data in the ADAPT data base can be acquired according to any of the codings assigned to the land elements. Population, employment, area, land use, housing, soil type, etc. data can be interrogated according to county, ADD, existing service area, water quality management segment, etc. The preceding capability was used to generate the tabular and graphical data of Chapter III, and Appendices A and B.

The data acquisition, management, and manipulation procedures used for the water pollution control management aspects of the land based data effort are as described in Chapter IV. The key decision with regard to the water pollution control management activities was the decision to retain the water quality management segment delineation previously developed by DNREP during prior 303(e) Planning efforts. The reasons for the decision to hold to the existing segment delineation are: the level of social and economic development and water resource use in the Basin are not sufficiently intensive to provide any material benefits through segment redefinition, the data base and societal objectives are not currently sufficiently developed/refined to permit optimization, the data base and techniques for assessing allocation are not currently at a level to support extensive searches on the implications of alternative segment delineation and allocations, and continuity is provided from one 303(e) Planning effort to the next. Classifications and priorities were determined for the existing segments.

Every effort was made to identify all point source discharges in the Basin. The point discharges were classified as being either domestic, municipal, or industrial depending on the prime source of the wastewater being discharged. The point discharges were thus evaluated and selected discharges designated as significant discharges. A significant discharge being one whose quality must be upgraded within the implementation period of the planning effort to realize the Basin water quality management objective. The criteria used to determine significant

discharges is presented in Chapter IV.

Because of the limited effluent quality data available to define the effluent characteristics of the point discharges, estimates were made of effluent quality based on the waste source and the type of treatment. When discharge flow data was available, it was used; in other instances, it was necessary to estimate flow using 100 gpd/person, or an equivalent type expression. The discharge data was then used in the conduct of a series of water quality modeling runs to determine which discharges were expected to be violating the water quality requirements of 5.0 mg/l DO and a maximum of 4 mg/l NH_3-N. The DO assessment was based on the assumption that the oxidation of carbonaceous and nitrogenous materials was occurring. The predicted water quality data was examined and a determination was made as to what treatment facilities would require upgrading to meet the water quality standards. The extent of upgrading required was determined by selecting from among the ten treatment options defined as being available for consideration, that option which seemed most likely to produce the desired effluent quality. Additionally, water quality model runs were then made to determine if the selection of required treatment levels was correct; if the selection was not appropriate, another selection was made and the cycle repeated. The preceding process resulted in a determination of the required treatment level for each discharger in the Basin.

The cost of providing the additional treatment required for each of the significant discharges was determined using information provided by the University of Louisville and Dr. J. Pavoni of Ten Ech, Inc., and estimates of the amount of renovation and new construction required to provide the specified level of treatment. In all instances influent quality was as specified for the 10 alternative treatment options. The cost of upgrading and/or expanding the wastewater collection and transport system to meet the 1980 demands was determined using updated costing techniques previously used by DNREP to do the "Needs Survey." The cost data was used in the determination of municipal needs and discharger priorities.

Priorities for the water quality management segments were determined using a formulation developed by DNREP and EPA personnel. The formulation considers population and the pounds per day of BOD, SS, NH_3, P, and metals discharged in excess of those allowed either by secondary treatment, NPDES Permit conditions or the waste load allocations, whichever is more restrictive; the information also considers thermal pollution and nonpoint source pollution. All the discharges to a segment, except cooling water discharges were considered in calculating the segment priority. The higher the priority number the greater are the water quality management problems in a segment.

Priorities were developed for the significant municipal discharges using a formulation developed by DNREP personnel. The formulation considers the cost of providing the water pollution control management facilities required for 1980, the distribution of that cost among the different elements of the facilities, i.e. treatment, collectors, interceptors, etc., the levels of treatment required, the location and magnitude of the tributary population, and what phase of the 201 process is necessary to move the project forward, i.e. Step 1, 2, or 3 of the 201 process.

The classification of the water quality management segments was based on consideration of the treatment required for the discharges to the mainstem of the segment, treatment required for discharges to tributaries of the mainstem, and the density of discharges, as follows:

- If any discharge to a mainstem requires treatment in excess of secondary treatment, for municipal/domestic discharges, or BPT for industrial discharges, the segment is classified as WQL.
- If there are no discharges to the mainstem but at least one discharge to the tributaries requires greater than secondary treatment or BPT then the segment is classified as WQL.
- If discharges to the mainstem do not require treatment in excess of secondary treatment or BPT, but there are many small discharges such that potential DO problems do exist, then the segment is classified as WQL.

Segments not meeting any one of the above criteria are classified as effluent (EL).

In addition to the point source considerations, general overview consideration was given to nonpoint sources as described in Chapter IV. Most nonpoint sources could not be addressed in any quantifiable manner; however, through the use of the ADAPT system, it was possible to generate some preliminary estimates of sediment loads produced in the Basin.

Water Quality Based Data Approach

The water quality related portion of the plan development was concerned with water quality modeling including, hydrologies, specification of treatment options and performance, and waste load allocations. The primary portions of this effort were carried out by personnel from the University of Kentucky and the University of Louisville. To a very large extent, the water quality related efforts established the boundaries and constraints for the conduct of the current 303(e) Planning effort; in this context it should be noted that the consultant for the 303(e) Planning effort for the Basins were not allowed to examine the character and function of the water quality model.

The water quality modeling was based on the classic Streeter Phelps formulation for calculating DO levels in streams, and was for the most part predicated on the assumption that the slope of a small stream can be used to predict the value of key parameters (i.e. the reaeration rate and the velocity) in the Streeter Phelps formulation. Additionally, certain other key parameters in the water quality model (i.e. deoxygenation rate and the rate of nitrogenous oxygen demand) were determined as a result of the input of a number of consultants involved in the overall 303(e) Planning effort. The water quality modeling approach used was probably appropriate in consideration of the large amount of work to be done, the limited time available, and the near absence of requisite data; however, it does appear appropriate that detailed sampling and modeling be done before any facilities plans are finalized as a result of either 208 or 201 Planning efforts. Additionally, it would appear mandatory that the water quality modeling capacity be updated/expanded prior to the conduct of the next cycle of

303(e) Planning, particularly in that nonpoint sources may be of vital concern in the next 303(e) Planning cycle. It should be noted that the water quality modeling approach was sanctioned by EPA.

With the concurrence of DNREP and EPA, five alternative treatment possibilities were specified. Given an influent quality of 250 mg/l of BOD_5 and 25 mg/l of NH_3-N; effluent qualities of 30, 20, 10, and 3 mg/l of BOD_5 were possible, and effluent qualities of 20, 15, and 1 mg/l of NH_3-N were possible. The 20 mg/l of NH_3-N could be obtained only with 30 mg/l of BOD_5, the 15 mg/l of NH_3-N could be realized in conjunction with a BOD_5 of either 20 or 10 mg/l and the 1 mg/l of NH_3N could be realized in conjunction with either 10 or 3 mg/l of BOD_5. The effluent DO level for each of the five treatment alternatives was 4.0 mg/l; however, an option was provided for each alternative wherein the effluent DO could be 8 mg/l.

The primary factors in determining treatment levels required were; the fact that most receiving waters were assumed to have 7 day 10 year minimum flows of or near zero, stream quality requirements of a DO of 5.0 mg/l or greater, and an NH_3-N concentration of 4.0 mg/l or less, and the fact that effluent DO levels could be either 4 or 8 mg/l and NH_3-N levels could be either 20, 15, or 1 mg/l. Thus, for so called "dry streams" and streams where treatment plant effluent dominated the flow, treatment alternatives providing 8.0 mg/l DO and 1 mg/l NH_3-N had to be specified. Fine tuning of the treatment requirements or consideration of other alternative treatment possibilities was not possible. In the course of the conduct of either 208 or 201 Planning, or future 303(e) Planning, the refinement of the delineation of treatment alternatives must be included.

THE BASINWIDE PLAN

The Basinwide plan in terms of facilities requirements and the foundation that has been developed for future planning processes is described in this section of the report. Additional elements of the basinwide plan are discussed in subsequent sections of this Chapter. The Basinwide plan consists of the following basic elements:

- The completely calibrated and operational ADAPT system and data base for the Basin which can be made available for subsequent 303(e) Planning efforts, as well as modified for 208 and 201 Planning efforts.
- Prioritization of the water quality management segments.
- Specification as to the water quality management segments that are water quality limited (WQL) and those that are effluent limited (EL).
- Specification of the Basinwide municipal needs to meet 1980 water quality management goals.

Although there was an indicated interest in addressing the 1995 treatment needs as part of the Basinwide plan this was not done pending clarification of the operational significance of the 1985 goal of PL 92-500 of "zero discharge of pollutants."

The priority and classification of the water quality management segments are indicated in Exhibit 4.1t; and the water quality and effluent limited water quality management segments are graphically illustrated in Exhibit 4.2m. The specific priority number for each segment, the ranking of each segment in terms of descending priority values, and the relative general ranking of each segment, i.e., high, low, medium, are illustrated in Exhibit 5.3m. There are 11 EL and 29 WQL water quality management segments in the Basin. None of the effluent limited segments are in the high priority category, the eight segments in the medium priority category are comprised of no EL segments and eight WQL segments, the remaining 30 segments are all in the low priority category. The latter 32 segments encompass 11 EL segments and 21 WQL segments.

The TMDL (Total Maximum Daily Load) and the MTDL (Maximum Theoretical Daily Load) for each of the 29 WQL water quality management segments in the Basin are presented in Exhibit 5.1t. The TMDL is the quantity of TOD (total oxygen demand) which will be discharged to the segment when all discharges are receiving a degree of treatment which does not result in a violation of water quality standards (see Appendix B tabular data each segment). The MTDL is the maximum pounds of oxygen that can be provided in the mainstem of the segment. Ideally, the MTDL value should always be greater than the TMDL value; however, roundoff error and situations wherein the tributaries to the mainstem have considerable carrying capacity create situations as illustrated in Exhibit 5.1t where TMDL is greater than MTDL. The more expected/typical situation is illustrated by the data for Segments 14, 16 and 17 where the actual capacity far exceeds that being used. Where the difference between TMDL and MTDL is large, it might be possible to reduce the level of treatment by getting a better distribution of the waste discharge throughout the segment.

The basinwide municipal needs for 1980 are displayed in Exhibit 5.2t, including the discharge priority, the allocated waste load in TOD, effluent characteristics, treatment level, and 1980 cost for getting the total wastewater management system where it is in compliance and meets demands that are listed for each significant municipal discharge in the Basin. The specified effluent quality is based on the designated treatment level. Of the 20 significant municipal discharges, five have priority values in excess of 1,000, fourteen have priority values in excess of 200. The projected total cost for bringing the 20 significant municipal discharges into compliance with the 1980 goals is $38,014,945. Thus, to bring the significant municipal discharges into compliance with the 1980 goals will require a capital investment of about $122 per capita in the Basin, based on expected 1980 populations.

WATER QUALITY MONITORING AND SURVEILLANCE

Historically, the water quality monitoring, conducted in the streams of Kentucky has been conducted by federal agencies, primarily the U. S. Geological Survey. In recent years, the State has assumed a greater role in water quality monitoring efforts, as participants in the Ohio River Valley Sanitation Compact and the Kentucky Water Quality Monitoring Strategy Team.

The monitoring strategy for FY 1976 was developed as a coordinated effort of federal and state agencies. This effort produced a specific set of sampling stations and a sampling program aimed at correcting

the deficiencies existing in the State's 305(b) Water Quality Inventory. Surveillance activities, including location of the stations, analyses to be conducted and a tabular and written summary of the program, are presented in Appendix A-1.

The initial cycle of the 303(e) process was undertaken with a limited amount of information available documenting the water quality conditions in Kentucky streams. These deficiencies included both water quality information and hydrographic information necessary to make determinations on travel time, reaeration rates, assimilative capacities, etc. Actual field verification of these parameters is critical to the modelling and analysis required to determine the effects of various pollutant loadings on the streams in this Basin. As many of the dischargers within the basin were estimated to require very high levels of waste treatment to meet and maintain water quality standards, field verification of in stream conditions may be appropriate in light of the significant costs that would be associated with high levels of treatment. Particularly, much of the cost for many of the plants would be associated with the requirements to achieve an effluent dissolved oxygen concentration of 8.0 mg/l. The effect of this requirement would not necessarily be evidenced in estimates of capital costs, but would have considerably greater impact on operation and maintenance costs. Additionally, in the case of municipal plants, where capital costs are financed in part with federal assistance, the operating and maintenance costs for post aeration would receive no such financial support when, in fact they are the more significant cost factor over the life of the facility.

To aid in securing the information to make more refined judgments on treatment requirements, an in stream sampling and analysis program is recommended. In this program, emphasis should be placed on the areas where stringent treatment levels have been stipulated. Particular attention should be placed on areas where post aeration or advanced/tertiary treatment levels were indicated. This program should be coordinated with the monitoring and surveillance program discussed in Appendix A-1 to continually update and refine the information base.

RELATIONSHIP TO OTHER PLANS

The 303(e) process is the most comprehensive, continuing planning and management level for water quality management specified in Public Law 92-500. For this reason, the scope of the activities undertaken in 303(e) planning has impacts on and is affected by the results of a large number of other water and land resource planning projects. In the Licking Basin, a number of these projects are being conducted by federal, state, regional and local agencies. As part of this early effort in the 303(e) cycle, the various agencies were contacted to discuss both the direction of the current 303(e) efforts and the recent, ongoing and proposed programs of the agency. The areas covered by the ongoing projects are shown in Exhibit 5.4m.

Federal/Interstate Planning Efforts

Corps of Engineers

The Corps of Engineers has a number of ongoing projects in the Licking Basin. The Lexington Urban Study incorporates Clark and Bourbon counties in the Licking Basin. The urban study program is a broad based program looking at many aspects of water resource management. These include: flood control, recreation, and water supply, in addition to a regional evaluation of water quality management alternatives in terms of sewage systems, treatment plant locations, nonpoint source control, etc. The study is currently underway and is being conducted by the Corps of Engineers District Office in Louisville, Kentucky. Initial project efforts began in 1974 and are in near full scale efforts at the present time.

Two major dam projects are located in the Licking Basin under the responsibility of the Louisville District Office. Cave Run Reservoir located on the main stem of the Licking River has been completed and is operational. Falmouth Lake also located on the main stem downstream of Cave Run is authorized as an active project, but no formal project work has been initiated.

Soil Conservation Service

The Soil Conservation Service of the United States Department of agriculture has a number of programs that relate to the 303(e) efforts. A number of these programs have been discussed earlier as they have related to mining, land use, soils and hydrologic information. In addition to these programs, small watershed planning projects are developed by SCS. The SCS describes these projects as follows (Reference V-1): Small watershed projects have come to mean protecting, managing, improving and developing the water and related land resources of a watershed up to 250,000 acres in size.

These projects can be multiple purpose watershed projects and are authorized under Public Law 566.

In the Licking Basin, there are four SCS watershed projects approved for operations as of July 1, 1974. These are:

- Fox Creek Project - located in Fleming County and Segment 31; includes Brushy Fork and Sand Lick River portions of Fox drainage area.
- Salt Lick Project - located in Bath and Menifee Counties and Segment 34; includes all of Salt Lick Creek to the Licking River.
- Mud Lick Creek Project - located in Harrison County along the South Fork of the Licking River in Segment 11.
- Twin Creek Project - located in Harrison County and Segment 11, includes both the North and South Fork of Twin Creek.

Additionally, application has been received to conduct a project in the Upper Licking River area of Magoffin County (Segment 40). As of 1 July 1974 this project had not yet been approved for planning.

Other Agencies

A number of other federal and interstate agencies

fund and undertake projects that relate to 303(e) planning efforts. The Appalachian Regional Commission (ARC) has underway and has completed a number of projects in the area. Of particular interest is a current study underway at Eastern Kentucky State University on surface mine pollution and land use (Reference III-33). The ARC completed a very comprehensive evaluation of the economic, water quality and development aspects of its area of responsibility and continues to serve as a prime source of information and funding for many programs in the Study Area.

Two major interstate agencies for water quality management exist for the Licking Basin - ORSANCO (the Ohio River Valley Sanitation Compact) with offices in Cincinnati has long since established itself as a major participant in water quality activities in the Ohio River Basin. ORSANCO has a number of continuous monitoring stations along the main stem of the Ohio River and focuses many of its efforts on the mainstem itself. Still, ORSANCO serves as a valuable resource for its many studies on the Ohio River Basin, its tributaries and the surface and groundwater resources in the area.

The Ohio River Basin Commission (ORBC) is the second interstate agency active in the Licking Basin. ORBC is charged with the authority to complete the Level B planning for the Main Stem of the Ohio River. This project is targeted for FY 1976 funding. Currently, ORBC is working on the continuing comprehensive joint plan for the area and provides technical assistance to the State on a number of water resource activities.

A recent draft report has been submitted to the National Commission on Water Quality evaluating the social, environmental, economic and institutional impacts of PL 92-500, that will result from the application of the requirements of the law on the mainstem of the Ohio River. Again, although the report focused on the mainstem of the Ohio, the economic, social and institutional implications of the law (as discussed in the report) do reflect potential conditions in portions of the Licking Basin, as a result of the 1977, 1983, and 1985 requirements of the law.

Other federal agencies that are involved with water quality activities include:

- Farmers Home Administration
- U. S. Forest Service
- U. S. Coast and Geodetic Survey
- U. S. Geological Survey
- Bureau of Outdoor Recreation
- Water Resources Council

State Planning Efforts

A number of state planning efforts are ongoing that have implications to the 303(e) process. The annual State Program Plan, prepared by the Division of Water (Quality) under the auspices of Section 106 of PL 92-500, provides the framework and administrative guidance of state water pollution program activities. Additionally, the Annual Report to Congress prepared under Section 305(b) of PL 92-500 which requires each state to submit to the USEPA a report on the status of water quality within the State is prepared. A significant aspect of this report is the cost estimate developed to meet the goals of PL 92-500 as pertains to both point and nonpoint source control.

In addition to the above activities of the Division of Water(Quality), the Division of Water in the Department for Natural Resources and Environmental Protection is responsible for water resources planning, as described in the Kentucky Framework Water Plan (Reference III-11). Since the original plan was prepared in 1971, no major modification efforts have been undertaken. However, information on recreation, flood drainage and water supply has been updated and reflects the current status of these activities.

As described in the land use section of this Chapter, the passage of KRS 147 on land use control created the 15 man Council for Land Use Planning. A report is to be prepared by this Council for a 1 November submittal that could have significant impact on upcoming 303(e) planning and management strategies developed by the Division of Water (Quality).

A number of other state agencies are responsible for water and land resource programs that impinge on the activities of the 303(e) process. These include:

- Department of Commerce
- Department of Fish and Wildlife
- Department of Mines and Minerals
- Department for Natural Resources and Environmental Protection
  - .. Division of Forestry
  - .. Division of Reclamation
  - .. Division of Conservation
  - .. Division of Special Programs
  - .. Division of Solid Waste
  - .. Division of Sanitary Engineering
- Office for Local Government

Local/Regional Planning Efforts

The first step in developing, expanding or upgrading sewage collection and treatment facilities requires the development of a Facilities Plan. The Facilities Plan for any of these improvements requires detailed engineering, environmental and economic analysis to be made prior to the development of final plans and specifications and construction of the facilities. Within the Licking Basin, a number of areas have been proposed that define the boundaries for the Facilities Plan for each of the urban or urbanizing areas. However, at the time of this initial 303(e) cycle, only a limited number of these areas had actually initiated the planning efforts (although most had at least begun the administrative paperwork). Representatives of the following areas were contacted for information relating to the status and character of their 201 planning efforts in an attempt to coordinate information developed in these 201 efforts with the initial 303(e) cycle when appropriate:

- Winchester
- Cynthiana
- Montgomery County Water District No. 2
- Morehead
- Mt. Sterling
- Carlisle
- Paris
- Flemingsburg

Section 208 of PL 92-500 provides for the prepa-

ration of Areawide Waste Treatment Management Plans (called 208 Plans) for an intensive evaluation of point source control and nonpoint source control methods to achieve water quality objectives in a defined regional area. A 208 Study was initiated in July 1974 for the Cincinnati SMSA under the direction of the Ohio-Kentucky-Indiana Regional Council of Governments (OKI). The OKI 208 plan is expected to take two years to complete and was only in its early stages during the conduct of this 303(e) effort. Much of the early effort of the 208 plan is being directed at nonpoint source problems. However, the nonpoint information was not available from OKI for use in the current 303(e) Plnaning cycle. It is anticipated that future 303(e) Planning efforts - especially as these related to utilization and expansion of ADAPT on a statewide basis - will require the close coordination of the 208 planning efforts of OKI with the 303(e) efforts of KDNREP .

The seven Area Development Districts that are a part of the Licking Basin have each produced a water and sewer plan for sewage collection and treatment facilities. These plans, as referenced in Chapter III, were referred to for basic data used in this initial planning cycle. Additional planning efforts (land use, utilities, institutions, etc.) of the ADD's, local planning commissions (e.g. Northern Kentucky Area Planning Commission) and regional agencies (e.g. OKI) are a continuing source for basic data required for 303(e) efforts and future efforts in the 303(e) program should be cognizant of the continuing efforts of these agencies in these related planning areas. The use of the ADAPT system will greatly enhance the capability of the State to incorporate these updated planning efforts into its 303(e) program.

LAND USE POLICIES AND CONTROLS

The following material was abstracted from material prepared by Mr. Hunter Lewis of Miller, Wihry and Lee, which was distributed for use by the river basin consultants. Some changes have been made in the original document for use in this report, but the basic documentation on the legal aspects and bases for land use planning was left intact.

The ways in which we utilize or conserve our land resources has significant impacts on water quality. Recently, community growth in some areas has attempted to follow carefully planned, programmed and staged development, while in many more areas, growth takes place in a less coordinated fashion. In the latter situations, development may take place irrespective of the community's ability to provide basic public services, such as water and sewers.

The Present Situation

Land use planning which has been undertaken in the past in the United States has been carried out chiefly by local governments. Authorization for local units of government to prepare and administer land use plans has been in the form of state enabling legislation. Beginning in the 1920's with federal government's publication and promotion of model enabling and zoning legislation, states were encouraged to delegate land use planning responsibilities to local governments.

Kentucky's planning statutes contained in KRS 100 including the 1966 revisions are based essentially on 50 year old enabling laws - enabling laws which were designed for communities of a different era. Cities were compact, undeveloped land was abundant and the environmental and social consequences of development were not of major concern. Land was viewed as a commodity, and zoning and other regulatory measures were tools utilized chiefly for the purpose of protecting property values. However, times and conditions have changed, yet we are still utilizing in many communities statutes and ordinances designed for an earlier period. The basic problem with zoning and other planning tools such as the comprehensive plan is that they are essentially negative, relying on the police power to protect the public safety, health and welfare. This is the opposite of incentive zoning which encourages desirable development to take place in proper locations. Another major deficiency in past land use planning efforts in the United States has been that local units of government were given land use planning authority but were frequently not given adequate financial and technical assistance to effectively utilize the authority.

Planning tools which are currently available to cities and counties in Kentucky under KRS 100 include: (1) comprehensive plans containing a statement of goals and objectives and principles, policies and standards to serve as a guide for the physical development and economic and social well being of the planning unit, together with plans for land use, transportation and communities (comprehensive plan may include any additional elements such as community renewal, housing, flood control, pollution, conservation, natural resources, and other programs which in the judgment of the planning commission will further serve the purposes of the comprehensive plan); (2) zoning regulations; (3) subdivision regulations; (4) an official map; and, (5) a capital improvement program and budget.

Land use planning was first introduced to many of Kentucky's smaller communities with the enactment of the Housing Act of 1954. Section 701 of the Act was originally designed to facilitate urban planning for smaller communities which lacked adequate planning resources. Planning activities funded through the 701 program durings its first 10 to 15 years of existence were almost exclusively concerned with physical planning including inventories of land use and other existing conditions, population and economic base analysis, plans for land use, community facilities, recreation, preparation of zoning ordinances, subdivision regulations and capital improvement programs. A proliferation of 701 funded comprehensive plans and zoning ordinances were prepared for Kentucky communities during the period from 1954 to 1970, many of which are in force today, essentially in their original form. Unfortunately, many of these comprehensive plans have major deficiencies in terms of present day environmental demands. For example, most of Kentucky's community comprehensive plans did not inventory the capability or the suitability of the natural environment to accomodate various levels and kinds of development and only a small number are backed up by important implementation tools such as the capital improvement program or capital improvement budget. The result, therefore, has been the production, in many instances, of less than adequate planning guides when gauged against today's mandates for sound land use planning and development within a carrying capacity context.

Through legislative amendments and administrative action, the 701 program became the basic Federal grant program for most planning agencies. Eligible recipients included localities of all sizes, counties, metropolitan and regional planning agencies, councils of governments, states, specialized agencies such as transportation planning organizations and interstate agencies. Kentucky was one of the first states to institute substate regionalism with the creation of fifteen Area Development Districts (ADDs), all of which relied heavily upon the 701 program for funding. The avowed functions of Kentucky's Area Development Districts are to:

1. Provide needed technical assistance to local governments.
2. Coordinate state and federal efforts to assist communities.
3. Review and coordinate local development proposals.
4. Conduct the necessary research and studies and coordinate and cooperate with all appropriate groups and agencies in order to develop, and adopt and revise, when necessary, a district development plan or series of plans, including, but not limited to, the following districtwide plan elements: goals and objectives; water and sewer; land use; and, open space and recreation. Such plans shall serve as a general guide for public and private actions and decisions to assure the development of public and private property in the most appropriate relationships (Reference V-2).

The major deficiency with regional planning agencies is their lack of legislative authority to implement plans. However, few if any regional agencies or states have taken the necessary action, that being the creation of areawide governments, to implement areawide plans.

Federal Role

The federal government provides extensive assistance to states and local governments and other agencies and organizations in the form of grants, loans, guarantees and technical assistance programs, many of which relate and impact upon the way in which land is developed and used. The large number of assistance programs, the wide and diverse activities which they support and the number of federal, state and local agencies involved in their administration presents an extremely difficult task in attempting to formulate and administer comprehensive land use planning programs at the state and local level.

Increasing emphasis has been placed in recent years on environmental consequences of federal actions. With the enactment of the National Environmental Policy Act of 1969, all federal and federally related actions having possible major effects on the environment are to be undertaken only after the preparation and filing of an Environmental Impact Statement. The Act affects all levels of the federal government as well as other activities which may be financed or connected with the expenditure of federal funds.

The National Environmental Policy Act also provides for the establishment of a National Council on Environmental Quality (CEQ). CEQ is responsible for formulating Impact Statement Guidelines and reviewing and commenting on Impact Statements. However, CEQ has no authority to approve or disapprove Impact Statements or to order the cessation of project activity. CEQ may only rule upon the adequacy of an Impact Statement. Only the President can order a halt to construction.

Sixteen states have taken similar action and require the preparation and filing of impact statements for nonfederal developments. However, Kentucky has not taken such action. Requirements for environmental impact statements generally include an analysis of the adverse and beneficial effects of the proposed development on people, animals, fish and vegetation in the area. Impact statements generally require suggestions for ways to avoid or minimize adverse environmental effects and indicate alternatives to the proposed action.

In recent years, Congress has spent considerable time in debating proposed federal land use legislation. While a federal land use bill has yet to pass both houses of Congress, it is likely that before too long a land use bill will become law. The land use bill which has come closest to passage called for land use decisions to be made on the basis of impact. Purely local decisions which affect only the local community would continue to be made by local public officials and local citizens. The American Law Institute estimates that nearly 90 percent of land use decisions are of purely local impact and significance leaving only 10 percent to regional, state and federal review.

The various land use bills which have been considered by Congress have generally included the following provisions:

- Designation of a state planning agency with planning staff and authority to compile a data base for planning, develop a land use planning program and coordinate its activities with local, state and federal planning and pollution control agencies.
- Inventories of land and natural resources including projections of land needed and suitable for development to meet economic and social needs.
- Development of methodologies to control use and development of land of more than local significance due to its size, environmental impact or potential to induce growth.

Five critical areas and uses are generally designated for control in most of the proposed land use bills:

- Areas of critical environmental concern, including historical or ecologically fragile lands, land subject to flooding and other natural disasters and regionally significant agricultural and watershed lands.
- Key facilities including those public facilities which tend to induce development or urbanization of more than local impact including airports, highway interchanges, recreational areas and energy facilities.
- Development of public facilities or utilities of regional benefit - including development of methods to assure that local regulations do not arbitrarily or capriciously exclude development of public facilities, housing or utilities of regional benefit.
- Large scale development - private development such as shopping centers, large subdivisions or apartment buildings which have the potential of creating environmental problems or generating

additional development.

- Land sales and development projects - large scale development more than 10 miles from a planning unit - second homes, vacation resorts and rural subdivisions.

The State Role

A number of states have already initiated state level land use controls of a comprehensive nature, with two systems of controls generally employed. One involves state establishment of guidelines for and administrative review of local land use planning, zoning and regulatory controls (Florida and Oregon). A second approach involves direct state planning and control (Hawaii, Vermont and Maine).

At the state level in Kentucky, an Economic Development Commission and an Environmental Quality Commission have been established. Additionally, the Kentucky Environmental Economic Development Policy Project, a group appointed by the Legislative Research Commission and partially financed by the National Science Foundation, has recently suggested the establishment of a Kentucky Enviro-Economic Council. The council, to be appointed by the governor, would seek ways to resolve conflicts between economic development and environmental protection and would be composed of representatives of business and industry, conservation, education, local and state government, labor and agriculture.

At the present time, Kentucky has not enacted statewide land use planning. However, largely in anticipation of adoption of a National Land Use Planning Bill, the 1974 Kentucky General Assembly enacted a new section of KRS 147 which recognized the need for Statewide land use planning:

> ...in order to protect the natural resources and environment of the Commonwealth, and to insure a water management system that will prevent, and reverse whenever necessary, the deterioration of water quality and provide optimum utilization of our limited water resources, and to facilitate orderly and well planned development and to protect the health, welfare, safety and quality of life of the residents of Kentucky, it is necessary to adequately plan for and guide growth and development within the Commonwealth. In order to accomplish these purposes, it is necessary that the Commonwealth of Kentucky establish land nad water management policies to guide and coordinate state, interstate and local decisions relating to growth and development, and that such state lnad and water management policies should to the maximum possible extent be implemented by local governments through processes for the guidance of growth and development, and that all the existing rights of private property be preserved in accord with the constitution of Kentucky and the United States.

The Act also established a Council for Land Use Planning composed of 15 members appointed by the Governor and representing a balance of interests in the Commonwealth. The Council is to be the Kentucky agency to fulfill federal requirements for councils associated federal programs designed to provide support for state land use planning functions.

The Council is to prepare by November 1, 1975 a report of work undertaken by the Council, and any findings, conclusions and recommendations including the structure of any state land use planning process, and methods for assuring the compatibility of any state land use planning legislation with National Land Use Planning Legislation. In addition, the report is to contain:

- Such proposals for changes in legislation as are recommended by the Council.
- Drafts of model development ordinances which will assist local governments in adopting development ordinances.
- Analyses of and comments on other relevant state and national commissioned studies and reports, and reports of public and private agencies.
- Review of and recommendations on the current status and effectiveness of local and regional planning agencies with regard to land and water management.
- Such other findings and recommendations as the Council choses to make.

The Federal Water Pollution Control Act Amendments of 1972 contain many provisions which could place the federal government in a position of arbitrating land use decisions within local communities. However, if local and state governments begin to reassert their rights and responsibilities for wisely planning and guiding growth in their jurisdictional areas, it would seem that a far more satisfactory situation would exist. The monetary costs of regulating and directing land use decisions should be significantly less with local versus federal direction, and, most importantly, local communities are best able to understand their own unique problems and needs.

The major problem facing many communities experiencing growth pressures is how best to guide growth in keeping with the community's ability to provide public services and protect the environment, while at the same time respecting the rights of the individual landowner. At the heart of the problem is the "taking issue" - the determination of when compensation must be paid when one's property is regulated to insure orderly community growth and protection of fragile elements of the environment within an area. As reported in the Taking Issue, prepared by the Council on Environmental Quality, statutory standards are currently being used in Great Britain to determine when compensation should be paid. Apparently this system has had success and has been favorably accepted by developers, environmentalists and planning officials and may be worthy of intensive study for applicability to situations in the United States (Reference V-3).

Additional techniques which are currently being advocated to achieve an equitable balance between the rights of property owners and the needs, abilities and capabilities of the larger community and of the environment include:

- Density rights transfer, whereby owners of land zoned for low density would be compensated for the loss of their right to build by owners of high density districts who require additional development rights to build to the legal limit.
- Preferential tax assessment for agricultural land to lessen the pressure to convert agricultural land on the urban fringe to urban use.
- A system of compensable regulations proposed for the American Land Institute's Model Land Development Code.

In summary, both the state and local units of

government need to take bold initiatives in examining innovative planning and growth management techniques so that: (1) equitable compromises can be established between the rights of property owners and the demands and needs of the larger community and the environment; and, (2) the majority of land use decisions which are of only local concern, remain within the purview of the local community.

The program being undertaken by the Kentucky Department for Natural Resources and Environmental Protection to establish the ADAPT system for the Commonwealth represents a significant step in this direction. The ADAPT data base that has already been established for the Licking Basin contains information of agricultural, silvicultural, mining and urban land use areas in each of the ADAPT cells. Although the cell sizes commensurate with 303(e) level planning are larger than may be required for other levels of planning (i.e. 208, 201, etc.), the information on the areas of each of these land use categories was estimated in increments of approximately 1 acre each.

The ADAPT system has the capacity to utilize this data base to produce information such as: estimates of nonpoint source runoff from proposed mining operations; estimates on land suitability for septic tank design; the sewer system costs for alternate development patterns and policies; etc. The key feature of ADAPT is its flexibility to quickly provide the information on alternative courses of action that decision makers need in the terms they need it. With this capacity available, local and/or state officials have the tool needed to give them the information required to assess the tradeoffs that exist in achieving competing economic land use, economic and water quality objectives.

Another land use activity occurring within the Licking River Basin which is having a significant impact on water quality is strip mining. The coal producing counties in the basin, including Magoffin, Morgan and Rowan, have experienced mining activity in the past and with the increased dependence of this country on coal, a major increase in mining activity is expected in the future. Impacts on water quality resulting from strip mining include high stormwater runoff rates from logging operations which often precede strip mining activity, erosion and siltation resulting from the actual mining activity and sedimentation problems from coal haul roads.

Kentucky has enacted strip mine legislation which is considered by many to be a model law. The Division of Reclamation within the Department for Natural Resources and Environmental Protection has been given responsibility for implementing these measures. The Division in turn has issued a number of regulations which detail strip mining standards and requirements, including: SMB-Rf-6: "Backfilling, Grading, Reclamation and Method of Operation," which specifies such things as bench width, water impoundment standards, methods of reclamation and vegetative planting; and SMR-11: "Water Quality," which requires the construction and maintenance by the operator of collection basins, water retaining structures, diversion ditches and silt dams. However, implementation and enforcement of these regulations has been extremely uneven, resulting in water quality degradation in a number of areas.

ADDITIONAL STATE STATUTES AFFECTING LAND USE

Deferred Tax Law for Agricultural Land (KRS 132)

In 1969 the voters in the Commonwealth approved an amendment to the Constitution which provided for the assessment of agricultural and horticultural land according to its use for those purposes. Statutory provisions were enacted in 1970 to implement the constitutional provisions which provides that if a landowner adopts another land use he must pay a monetary penalty in the form of a higher assessment and the deferred taxes, predating the land use change for those years.

As of this time, this method of deferred taxation has not been particularly effective in achieving its original land planning purpose of preserving open space at the finges of Kentucky's growing cities. However, provisions for strengthening the statute to achieve its original intent are currently being developed by an interim committee of the legislature.

Power Plant Siting Law (KRS 278.025)

In 1974 the Kentucky General Assembly enacted a new section of KRS 278 which requires that prior to the constructing of a facility for the generation of electricity to or for the public for compensation, a "certificate of environmental compatibility" must be obtained from the Public Service Commission.

Sanitation Districts (KRS 220.030)

Sanitation Districts may be formed in any county or across county lines to prevent and correct the pollution of streams, to regulate the flow of streams for sanitary purposes, or to provide for the collection and disposal of sewage and other liquid wastes. Cities may be included in these districts.

Soil Conservation Districts (KRS 262.200)

Soil Conservation Districts may be formed to implement soil conservation practices at the local level. The areas of a District may cut across county lines and include cities-or parts thereof.

Watershed Conservancy Districts (KRS 262.700)

Watershed Conservancy Districts may be created as subdivisions of Soil Conservation Districts to develop and execute programs pertaining to water usage, flood prevention and control, sediment damage, and erosion control.

Exhibit 5.1t - Waste Load Characteristics of Water Quality Limited Segments - Licking River Basin

Segment No.	TMDL lb/day TOD	MTDL lb/day TOD	Segment Priority No.
3	237.73	333	813.1
4	4.30	19	118.7
5	0.22	0	102.0
7	1.15	1	107.9
8	15.16	36	130.9
9	10.59	21	130.6
10	3.67	5	113.8
12	1.27	2	106.0
14	1,291.78	3,412	496.2
16	448.63	5,950	1,738.0
17	814.37	2,254	316.3
19	9.01	4	147.4
20	498.11	2,441	2,153.2
22	7.51	19	126.2
23	0.30	24	106.1
24	0.60	0	102.4
25	0.15	0	101.1
27	0.80	2	105.2
28	6.43	98,606	345.7
29	77.55	280	264.9
30	0.37	0	102.0
31	1.63	-----	109.1
32	35.19	134	592.4
33	1.22	3	105.6
34	1.95	0	108.5
35	192.10	427	719.2
36	26.74	4,748	215.8
37	11.56	31	136.7
40	20.00	44	141.7

Exhibit 5.2t - Basinwide Needs for 1980 and 1995 - Licking River Basin

Discharge Priority	Code Number	Facility	Non-Conservative Waste Load Allocation lb/day TOD	Compliance Goals 1980 (1995) Flow mgd	BOD mg/l	SS mg/l	NH3 mg/l	DO mg/l	Other mg/l	Treatment Needs 1980 (1995)	Cost* 1980
5,769.5 Bb	05107	Winchester Town Br. STP	291.9	1.75	10	10	1	8	-----	T4B	T- 1,150,000 I- 87,000 C- 2,830,000
3,444.4 Ca	05094	Mt. Sterling STP	266.88	1.6	10	10	1	8	-----	T4B	T- 1,759,000 I- 477,000 C- 750,000 I&I- 253,000
2,121.4 Aa	05017	Elsmere Municipal STP	145.11	0.87	10	10	1	8	-----	T4B	T- 1,111,000 C- 3,488,000 I&I- 508,000
1,504.6 Ca	05147	Morehead STP	135.10	0.81	10	10	1	8	-----	T4B	T- 1,444,000 I- 639,000 C- 1,892,000 I&I- 77,000
1,028.3 Ca	05---	Montgomery Co. San. Dist. #2	10.84	0.065	10	10	1	8	-----	T4B	T- 656,000 I- 101,000 C- 489,000
702.8 Ca	05098	Millersburg STP	135.10	0.12	30	30	20	4	-----	T1A	T- 521,000 I- 1,228,000 C- 568,000 I&I- 96,000
614.1 Ca	05079	Cynthiana STP	1,261.00	1.12	30	30	20	4	-----	T1A	T- 1,395,000 I- 1,278,000 C- 1,667,000 I&I- 580,000 CS- 282,000
424.6 Ca	05130	Flemingsburg STP	38.36	0.23	10	10	1	8	-----	T4B	T- 380,000 C- 380,000 I&I- 115,000
422.9 Ca	05138	Owingsville STP	30.02	0.18	10	10	1	8	-----	T4B	T- 335,000 I- 70,000 C- 117,000 I&I- 55,000
335.6 Ca	05---	Mt. Olivet STP	4.17	0.025	10	10	1	8	-----	T4B	T- 487,000 C- 150,000
308 Ca	05163	West Liberty STP	21.68	0.13	10	10	1	4	-----	T4A	T- 327,000 C- 194,000 I&I- 237,000
253.9 Ca	05088	Carlisle STP	26.69	0.16	10	10	1	4	-----	T4A	T- 324,000 I- 63,000 C- 594,000 I&I- 142,000
251 Ca	05099	Paris STP	788.13	0.70	30	30	20	4	-----	T1A	T- 118,000 I- 279,000 C- 2,270,000 I&I- 113,000
249.7 Ca	05---	Bath Co. Water Dist. #2	101.33	0.09	30	30	20	4	-----	T1A	T- 508,400 I&I- 558,775 C- 654,770
182 Ca	05106	North Middletown STP	9.00	0.054	10	10	1	8	-----	T4B	T- 638,000 I- 14,000 C- 65,000 I&I- 86,000
165.2 Ca	05171	Frenchburg Municipal STP	8.34	0.05	10	10	1	8	-----	T4B	T- 222,000
87.1 Ca	05174	Salyersville STP	13.34	0.08	10	10	1	8	-----	T4B	T- 226,000 I- 210,000 C- 459,000 I&I- 36,000

LICKING RIVER BASIN

EXHIBIT 5.3m

BASINWIDE MANAGEMENT PLAN

LEGEND

x 50 RIVER MILES

102.3 / 12 SEGMENT PRIORITY NUMBER / SEGMENT RANK IN BASIN

HIGH PRIORITY

MEDIUM PRIORITY

LOW PRIORITY

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

PDR

PROCTOR-DAVIS-RAY
Lexington, Kentucky

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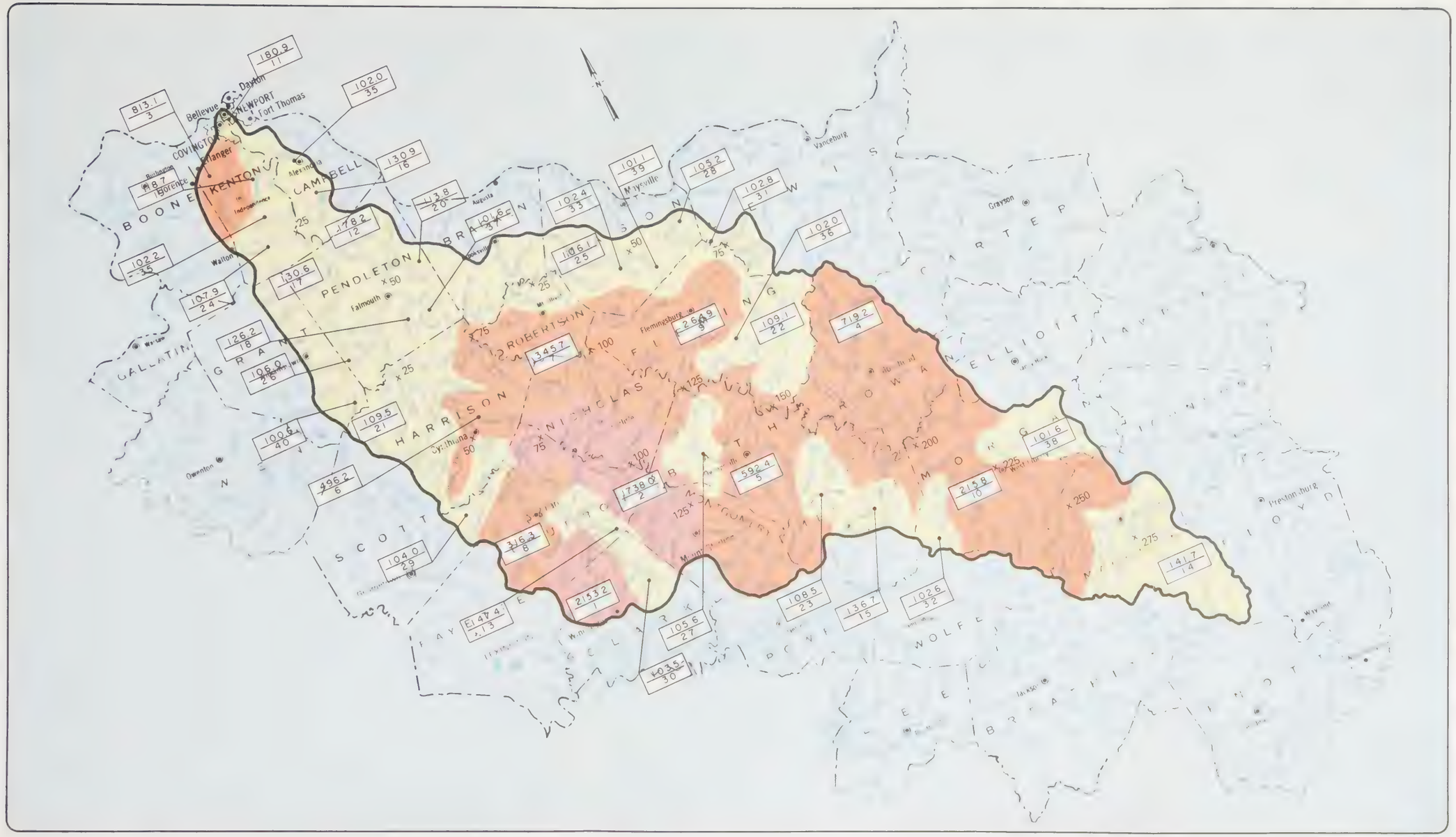

LICKING RIVER BASIN

EXHIBIT 5.3m

BASINWIDE MANAGEMENT PLAN

LEGEND

x 50 RIVER MILES

1023 / 12 SEGMENT PRIORITY NUMBER / SEGMENT RANK IN BASIN

HIGH PRIORITY

MEDIUM PRIORITY

LOW PRIORITY

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

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LICKING RIVER BASIN

EXHIBIT 5.4m

RELATIONSHIP TO OTHER PLANS

LEGEND

x 50	RIVER MILES
(20)	SEGMENT NUMBER
	201 INTENSIVE AREAS
	201 GENERAL AREAS
	208 AREAS CORPS OF ENGINEERS URBAN STUDIES
	SCS APPROVED SMALL WATERSHED PROJECT

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data U S Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

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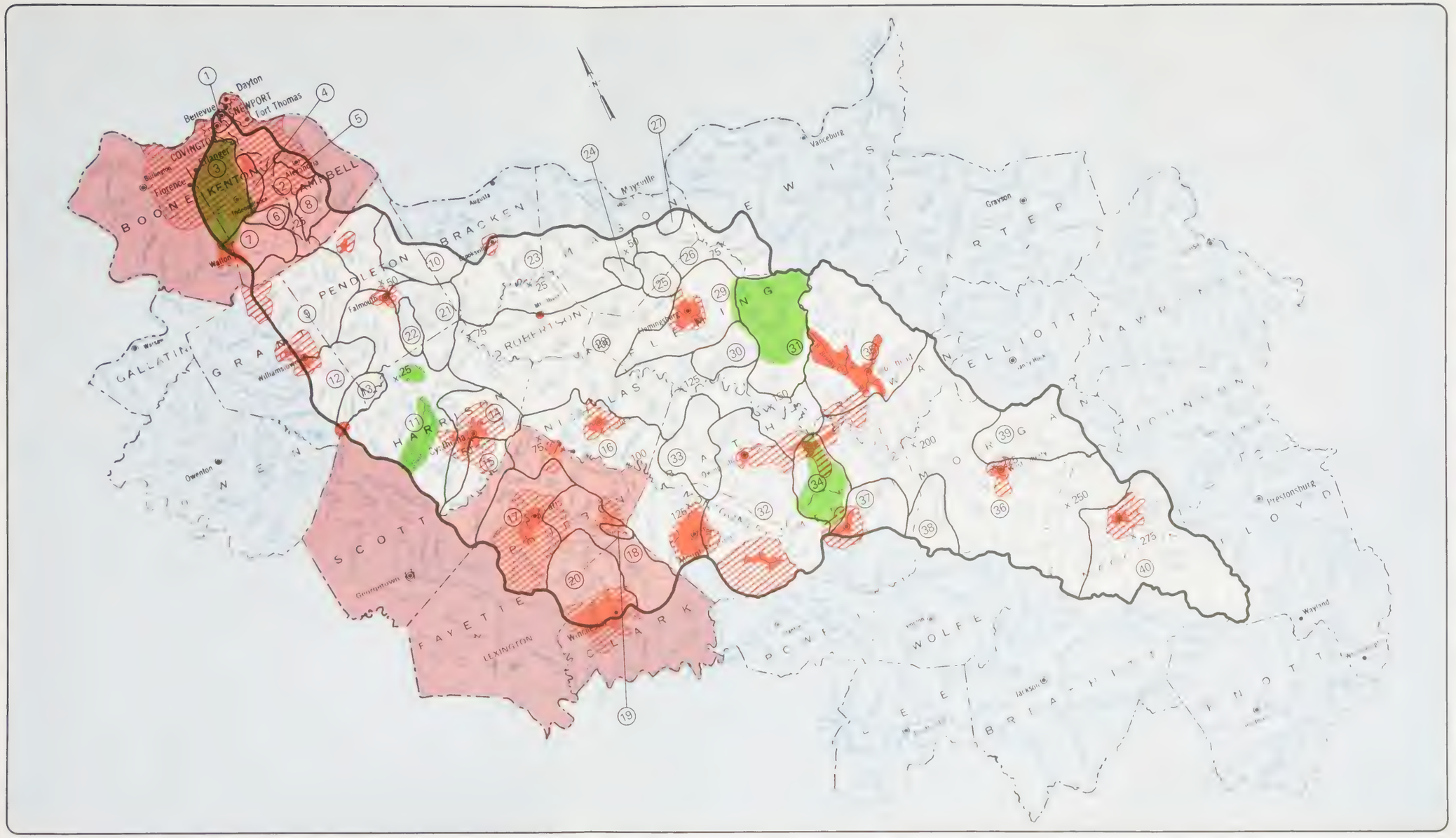

LICKING RIVER BASIN

EXHIBIT 5.4m

RELATIONSHIP TO OTHER PLANS

LEGEND

- x 50 — RIVER MILES
- (20) — SEGMENT NUMBER
- 201 INTENSIVE AREAS
- 201 GENERAL AREAS
- 208 AREAS CORPS OF ENGINEERS URBAN STUDIES
- SCS APPROVED SMALL WATERSHED PROJECT

5 0 10 20

GRAPHIC SCALE IN MILES

Base Data ... U. S. Geological Survey

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

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Exhibit 5.2t - Basinwide Needs for 1980 and 1995 - Licking River Basin

Discharge Priority	Code Number	Facility	Non-Conservative Waste Load Allocation lb/day TOD	Compliance Goals 1980 (1995) Flow mgd	BOD mg/1	SS mg/1	NH3 mg/1	DO mg/1	Other mg/1	Treatment Needs 1980 (1995)	Cost* 1980
21.6 Ca	05194	Butler STP	67.55	0.060	30	30	20	4	-----	T1A	C- 229,000
18.7 Aa	-----	Taylor Mill STP	--------	-----	--	--	--	--	-----	T1A	C- 2,062,000
0 Ca	05070	Falmouth STP	303.99	0.27	30	30	20	4	-----	T1A	----------

*Costs in 1975 for additional facilities required to meet 1980 needs.

T = Treatment
I = Interceptor
C = Connectors
I&I = Infiltration/Inflow
CS = Combined Sewers

Chapter VI

PUBLIC PARTICIPATION

Public participation is at one and the same time a beautifully simple concept and a complex admission about ongoing political processes and institutional decision making. In concept public participation should provide the opportunity for any citizen, informed or uninformed, interested in a particular public institutional activity to provide information to those directly responsible for the institutional activity as to how such activities might be changed/improved to better serve those affected by the activity. Although, public participation appears to be rapidly gaining a "niche" in the political and institutional arenas as an institutionalized process, the realities of public participation do not bear much resemblance to the concept of public participation. Instead of the ever expanding legal requirements for public participation creating an atmosphere of mutual cooperation between the public, the institutions, and the body politic, they have, to a large extent established formal arenas wherein vested interest groups can deal with the institution on an advisory basis. The average citizen making up the general public has benefitted little, if at all, from the evolving emphasis on public participation.

Most institutions are not "clean" in terms of the preceding, because they all too often have exhibited an elitist attitude and behavior in carrying out this legislatively mandated mission.

Given the above or representing what appears to be the evolving normative realities of public participation institutions are increasingly being placed "on the horns of a dilemma." If institutions proceed without providing for public participation at a level deemed appropriate by the vested interest groups they are likely to become bogged down over the issue of their inappropriate behavior, if institutions pursue a vigorous public participation program, their decision making process is likely to be thwarted; in either of the preceding situations an institution will be unable to meet legislatively and administratively specified schedules for executing its responsibilities. The problem is of course created by the fact that legislation specifying public participation and institutional responsibilities rarely gives recognition to the impact that meaningful public participation can have on the rate at which things can be accomplished. Until legislative consciousness is raised as to the true implications of public participation on the ability of institutions to meet schedules, and allowances made in schedules for such participation, institutions will have to continue to navigate a rather arduous path.

PUBLIC PARTICIPATION FOR 303(e) PLANNING

The requirements for public participation relative to 303(e) Planning are presented in 40 CFR 130.13, the essence of which is that, public participation must be provided in accord with Section 101(e) of PL 92-500, and public participation, including a public hearing, shall be required relative to significant elements of the planning process. Section 101(e) of PL 92-500 declares, in part, that, "Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this Act shall be provided for, encouraged, and assisted by the Administrator and the States." To a major extent, EPA and others have determined that the essence of Section 101(e) is business as usual, i.e., the prime requirement of public participation is the public hearing.

PUBLIC PARTICIPATION FOR THE BASIN 303(e) PLANNING PROCESS

The public participation process associated with the development and promulgation of the 303(e) Planning process for the Basin was carried out in three different elements. Element One involved a "broad brushed" distribution of announcements and overview information. Element Two involved various types of general and one on one meetings and discussions. Element Three consisted of a formal public hearing.

Element One

The activities in Element One were coordinated with the Governor's Office of Local Governments and included the following:

- At the beginning of the project a news release was sent to newspapers in the Basin by the Office of Local Governments.
- Two articles were published in the Office of Local Governments Newsletter which is distributed to all local government officials, planning agencies, etc.

Element Two

In order to assure statewide coordination of the 303(e) Planning process, including public participation, regular monthly meetings of the 303(e) Planning consultants for the Commonwealth of Kentucky were held. Additional coordination of effort was accomplished with the assistance of the ADD's and the Environmental Quality Commission. Representatives of the 303(e) Planning consultants met with the Environmental Quality Commission to describe and discuss the 303(e) Planning process. On several occasions, representatives of the Environmental Quality Commission attended the regular meetings of the 303(e) Planning Consultants.

The first formal Element Two activity was a presentation to the Board of Directors of each ADD located partially or totally within the Basin. The membership of the Boards of Directors for the ADDs is composed of representatives of local governments. The presentations were comprised of pictorial and graphical displays accompanied by background documentation on the 303(e) Planning process. Following

the presentations there was "open flow" discussion. Most of the discussion focused, as was desired, on local water related issues. To minimize the time demands placed on the ADD's, as had been requested, the consultant coordinated the presentations such that each ADD was given one presentation regardless of the number of river basins residing partially or totally within an ADD.

Prior to and following the presentations to the Boards of Directors of the ADD;s , several individual meetings were held with the Executive Directors and/or staff members of each ADD. As another part of the followthrough on the ADD presentations, contacts were made with several local government officials and consulting engineers who are employed by local governments in the Basin. The purpose of these contacts was to obtain more in depth information on the characteristics of existing wastewater management facilities and/or ongoing 201 Facilities Planning for the purpose of coordination with the 303(e) Planning efforts.

The final Element Two activity was a workshop. The individual Basin Workshops were arranged and conducted by Mrs. Jackie Swigart, Chairman of the Environmental Quality Commission. Representatives of the 303(e) Planning Consultants participated in the Basin Workshop. Citizens attended the Workshop. Those attending the Workshop included local government officials, representatives of major industries and industrial groups, and representatives of citizen interest groups. Persons attending the Workshop were concerned with interest specific, local situations and problems, and the possible impacts thereon by the 303(e) Planning process.

Element Three

A public hearing for all 303(e) Planning efforts in the Commonwealth of Kentucky was held in Frankfort, Kentucky on June 27, 1975 by the Department for Natural Resources and Environmental Protection.

WATER QUALITY DATA

WATER QUALITY DATA

Historical and ambient water quality monitoring information is necessary for the support of the overall water quality management planning process. Historically water quality monitoring in the streams of Kentucky has been conducted by federal agencies, primarily the U. S. Geological Survey.

The U. S. Geological Survey has published records of chemical quality, water temperatures, and sediment discharge since 1941 in an annual series of papers entitled, "Quality of Surface Waters of the United States." Since 1964, water quality records have been released by the U. S. Geological Survey in annual reports published on a state by state basis. The most recent available Water Resources Data report for Kentucky is for the period from 1972 to 1973 (Reference IV-1). In the U. S. Geological Survey monitoring programs, water quality samples have been collected typically at or near stream flow gaging stations in order that discharge records for these stations can be used to compute the discharge rates of chemical constituents and suspended sediments. The chemical constituents monitored have included dissolved constituents (e.g. sulfate, chloride, nitrate, phosphorous, and total dissolved solids); and certain parameters such as hardness, specific conductance, and pH. The microbiological monitoring has included the quantitative identification of certain bacteriological indicator organisms (e.g. fecal coliforms and streptococci). Water temperature data has been collected typically on a once or twice weekly basis except for stations where a continuous temperature recorder capable of recording minimum and maximum daily temperatures has been deployed. Fluvial sediment information is reported for suspended sediment concentrations and discharge rates and for particle-size distributions of suspended sediment.

In recent years, the State of Kentucky has assumed a greater role in the acquisition of water quality data. The Division of Water has been actively involved in two major water quality monitoring efforts, the Ohio River Valley Sanitation Commission (ORSANCO) for monitoring the Ohio River, and the Kentucky Water Quality Monitoring Strategy Team for the monitoring of streams within the Commonwealth. These monitoring strategies have been developed in cooperation with other state and federal agencies directly involved in water resource related activities in Kentucky and in recognition of the proposed Rules for Water Quality and Pollutant Source Monitoring.[1]

The implementation of the Kentucky Water Quality Monitoring Strategy in Fiscal Year 1976 is intended to correct the deficiencies existing in the 305b Water Quality Inventory. Strategies for monitoring the waters of the Commonwealth during 1975 and 1976 have and are being developed as a coordinated effort of state and federal agencies, including the: U. S. Geological Survey; U. S. Army Corps of Engineers; U. S. Environmental Protection Agency (EPA); U. S. Department of Agriculture, Soil Conservation Service; State Department for Natural Resources and Environmental Protection (DNR&EP), Division of Water Quality (Quality), and Division of Sanitary Engineering; State Department of Fish and Wildlife, Division of Conservation (DNR&EP); Kentucky Geological Survey and Kentucky Office of Local Government.

A summary of the results of the Kentucky Monitoring Strategy for Fiscal Year 1975 is presented in "Kentucky Water Quality Report to Congress" (Reference IV-4). This report contains river basin and water quality descriptions for the Licking River Basin. The Fiscal Year 1975 report contains water quality data provided by U. S. Geological Survey and the Division of Water as retrieved from STORET, EPA's water quality data storage system.

One objective of the Water Quality Monitoring Strategy for Fiscal Year 1976 is to streamline the water quality monitoring effort while expanding the utility of the data base. To accomplish this objective, a primary monitoring network was established to describe a portion of the total water quality profile of the waters of the Commonwealth. A network of secondary stations was set up to fill individual agency needs not covered by the primary monitoring network. The locations of the six primary and seven secondary stations, and the water quality parameters to be measured at each, are presented in Exhibit A-1t. The seven secondary stations which have been identified by the Strategy Study Team may be subject to change for Fiscal Year 1976.

Of the six primary water quality monitoring stations in the Licking River Basin, two are scheduled for operation as both flow and water quality monitoring stations (Nos. 057 and 062). One station (No. 058) is situated at the headwaters of a lake and to be operated to measure stage height at each site. Three stations (Nos. 059, 060, and 061) will not be operated as either flow or water quality monitoring stations, but will serve other purposes.

As is shown in Exhibit A-1t, there are many more stations for the Licking River Basin listed in STORET than there are State water quality monitoring stations. This occurs because the STORET system contains water quality data as reported to EPA by many different governmental and private sources. It can also be seen from Exhibit A-1.t that only five of the 13 State water quality monitoring stations correspond to those established earlier by the U.S. Geological Survey.

Notwithstanding the diversity of data sources, the STORET data management system has brought together a large volume of data for a diversity of parameters, including: color, conductivity, pH, alkalinity, calcium, magnesium, fluoride, silica, iron, nitrate, dissolved solids, chlorides, and hardness. STORET output is available either in the

[1] Federal Register, 39, No. 168, Part III (August 28, 1974).

format of complete listings of all observations made at a station in a given time period, or as statistical characterizations of the data distributions for all observations made at a station in a selected time period.

Exhibit A-1t - Water Quality Data - Licking River Basin

Station No. USGS/STORET*	Station No. State**	State Designation	Location	Latitude	Longitude	Parameters - KY Water Quality Monitoring Program
03 248500	181	2°	Licking River near Salyersville	37° 45' 03"	83° 05' 04"	Temp., Sp. Cond., Color, pH, Diss. Solids, Cl, Phos, Common Ions, Hardness
03 249500	180	2°	Licking River at Farmers	38° 08' 24"	83° 33' 26"	Temp., Sp. Cond., pH, Diss. Solids, Cl, Phos, Common Ions, Hardness
03 251500	---	--	Licking River at McKinneysburg	38° 35' 52"	84° 16' 00"	
03 252500	---	--	S. Fk. Licking River at Cynthiana	38° 23' 27"	84° 18' 11"	
03 250100	---	--	No. Fk. Triplett Cr. near Morehead	38° 11' 57"	83° 28' 50"	
03251000	062	1°	No. Fk. Licking River near Lewisburg	38° 32' 57"	83° 47' 37"	Temp., Sp. Cond., pH, Diss. Solids, Cl, Phos, Common Ions, Hardness
03 251400	---	--	No. Fk. Licking River near Milford	38° 35' 00"	84° 09' 20"	
03 252000	183	2°	Stoner Cr. at Paris	38° 13' 45"	84° 15' 22"	----------
03 252300	---	--	Hinkston Cr. near Carlisle	38° 14' 33"	84° 03' 09"	
03 253500	---	--	Licking River at Catawba	38° 42' 37"	84° 18' 39"	
-- ------	---	--	Salyersville	37° 45' 01"	83° 04' 34"	
03 282500	---	--	Red River near Hazel Green	37° 48' 44"	83° 27' 50"	
03 248640	058	1°	Licking River at West Liberty	37° 54' 53"	83° 15' 42"	----------
03 248700	---	--	Elk Fk. near West Liberty	37° 56' 35"	83° 16' 59"	
03 248900	---	--	No. Fk. Licking River at Bangor	38° 02' 22"	83° 26' 03"	
-- -----	---	--	U. S. Army Signal Depot	38° 04' 20"	84° 19' 11"	
03 287620	---	--	No. Elkhorn Cr./ Unnamed Tributary at Muir S.	38° 05' 21"	84° 21' 41"	
03 250240	---	--	Slate Cr. near Owingsville	38° 08' 29"	83° 43' 43"	
-- ------	---	--	D. T. Phillips	38° 08' 40"	84° 09' 05"	
-- ------	---	--	----------	38° 10' 03"	83° 58' 32"	
-- ------	---	--	----------	38° 13' 45"	84° 15' 22"	
-- ------	---	--	----------	38° 14' 33"	84° 03' 09"	
03 254700	---	--	Licking River at Covington	39° 03' 05"	84° 29' 42"	
03 200523	---	--	Licking River at 12th Street Bridge	39° 04' 07"	84° 29' 58"	
-- ------	057	1°	Licking River at Butler	-- -- --	-- -- --	----------
-- ------	059	1°	S. Fk. Licking River near Morgan	-- -- --	-- -- --	No Quality
-- ------	060	1°	Strodes Cr. below Hood Cr.	-- -- --	-- -- --	No Quality
-- ------	061	1°	No. Fk. Licking River Mt. Olivet	-- -- --	-- -- --	No Quality
-- ------	177	2°	Banklick Cr. near Mouth	-- -- --	-- -- --	----------
-- ------	178	2°	Licking River Falmouth	-- -- --	-- -- --	----------
-- ------	179	2°	Triplett Cr. Bluestone	-- -- --	-- -- --	----------
-- ------	182	2°	S. Fk. Licking River near Grays River	-- -- --	-- -- --	----------

*Source: STORET Computer Printouts for Licking River Basin
**Source: Letter of February 21, 1975, from DNR & EP to KY W.Q. Monitoring Strategy Study Team.

Appendix A-2

POPULATION DISAGGREGATION

POPULATION DISAGGREGATION

In accord with the specifications for the 303(e) Planning requirements for the Licking River Basin, the data presented in the tables of this Appendix constitute a characterization of the population in the Licking River Basin, in terms of areal units (counties), water quality management units (stream segments), and selected subcategories of population as defined by habitat/land use (urban, rural, farm, non-farm). The data presented in the accompanying tables are as obtained from the ADAPT data base using selected programs to extract and organize the data. The ADAPT data base was designed and built so that the population data could be obtained/ organized using any of a number of primary and secondary dimensions, and combinations thereof. The preparation of the population data for input to the ADAPT data base is discussed below.

The primary population data was obtained from the data sources discussed in Chapter III. The primary population data was used for the baseline data presented in the accompanying tables. In order to provide for the population characterization in the above noted terms, it was necessary to perform certain data manipulations based on selected assumptions about the data and how populations occur within the River Basin.

Population data in the Commonwealth of Kentucky is organized primarily in terms of enumeration districts and census tracts; both are areal measures, with enumeration districts being dominant at least in terms of area covered. Census tracts are used within selected areas in SMSA's. It was decided to use enumeration districts exclusively for purposes of the information of this report; this decision required the creation of new enumeration districts; which are synthetic in terms of the official population data management efforts within the Commonwealth, to replace the census tracts for data management and manipulation purposes. Also populations are routinely categorized in the Commonwealth of Kentucky in terms of SMSA populations, rural populations, and urban center populations, these characterizations were of some value in the preparation of the ADAPT data base.

The 1970 census information was the principal information used to develop the 1970 spatial population distributions. Formulated 1970 census data wherein the population data are presented for each enumeration district for each county were obtained from the Kentucky Department of Commerce. The 1970 population data for those SMSA urbanized areas which are not organized by enumeration districts, and were not presented in the preceding data source, were obtained from the U. S. Department of Commerce, Bureau of the Census, 1970 Census of Housing: Block Statistics report.

In order to associate enumeration districts with specific urban or incorporated areas, exclusive of SMSA urbanized areas, mapped data/information provided by the Kentucky Department of Commerce and the Kentucky Department of Transportation were used. Maps showing urban and incorporated areas were overlaid with maps showing the enumeration district boundaries and the enumeration district -- urban/ incorporated area associations noted. An enumeration district was assumed to be associated with a rural setting if it was associated with neither an urban or incorporated area.

The area within a SMSA can generally be divided into urbanized area, rural area, and isolated incorporated areas. For areas in the River Basin within the SMSA category, the illustrations in the Block Statistic report were used to develop the association between enumeration districts and the generic types of areas within a SMSA. Enumeration districts within the urbanized areas were assumed to be totally urban in character, as were enumeration districts associated with specific (isolated) incorporated areas within a SMSA. Enumeration districts within a SMSA, but outside the urbanized areas and not representing specific incorporated areas, were assumed to be rural in character.

As noted above, not all the urbanized area within a SMSA is routinely associated with enumeration districts, i.e., some of it is associated with census tracts. Thus, in order to maintain the uniformity of use of enumeration districts for organizing population data, new enumeration districts were created by aggregating adjacent census tracts within a SMSA which exhibited similar development characteristics (i.e. urban center, suburban, low density suburban).

For purposes of ADAPT data management, each enumeration district was subdivided into an appropriate number of ADAPT cells such that each ADAPT cell was uniquely associated with a specific enumeration district. Additionally, each enumeration district could be uniquely defined in terms of an aggregation of contiguous ADAPT cells.

The existing enumeration districts, and those created for the purposes of the planning effort, were not delineated with any regard for river basin boundaries. Therefore, in addition to the above noted types (associations) of enumeration districts, the enumeration districts also had to be considered with regard to those located totally within the River Basin, and those only partially located in the River Basin. It was decided to use area as a basic measure to determine what portion of the 1970 population of an enumeration district located partially in the River Basin was resident in the River Basin. The ratio of the area of the enumeration district located in the River Basin to the total area of the enumeration district was applied to the total enumeration district population to determine the in-basin enumeration district population.

The 1970 in basin population for each enumeration district was input to ADAPT based on the assumptions that the population density within an enumeration

district would be uniform. Thus, the population assigned to each ADAPT cell in an enumeration district was the same fraction of the enumeration district population as fraction of enumeration district area represented by the ADAPT cell area.

The 1970 urban population shown in the accompanying tables corresponds to the sum of the populations in all the ADAPT cells associated with all incorporated areas and all unincorporated urbanized areas in a SMSA. The rural population is the total 1970 population residing in rural enumeration districts and assigned to the associated ADAPT cells.

It was required that the rural population be classified as to being either farm or non-farm population. The basic information used to develop expressions for allocating the rural population to the farm and non-farm categories was obtained from the U. S. Department of Commerce, Bureau of the Census Publication "General Social and Economic Characteristics." The rural, non-farm population defined for 1970 in the preceding publication includes the population of incorporated areas with less than 2,500 residents. However, through use of the ADAPT cell structure, the small incorporated areas could be readily and uniquely defined, thus, for purposes of preparing the accompanying tables, the incorporated areas with less than 2,500 residents were defined as "small urban" areas. The population of the "small urban" areas was deducted from the total rural, non-farm population, presented in the census information, prior to determining the percent farm and percent non-farm population which prevailed in 1970 for the rural enumeration districts.

No projections defining the expected future distribution of rural population to the farm and non-farm categories were available. In the absence of any information derived from projections, it was assumed that the 1970 percentage values for defining the distribution of rural population among the farm and non-farm categories would prevail at all times in the future. Should the preceding assumption prove invalid or nonapplicable, it can be revised and the data base could be readily updated within the ADAPT framework.

Population projections at the county level are contained in the report entitled, "Kentucky Population Projections: 1975 - 2020, Volumes 1 and 2." The report was prepared for the Kentucky Program Development Office by Spindletop Research in 1972. Projections were made for the years 1975, 1980, 1990, 2000, 2010, and 2020. The percent urban population is presented for each of the projection years for each county that had at least one urban center (i.e. an incorporated area with more than 2,500 residents or a SMSA urbanized area) in 1970. Inasmuch as the anticipated percent urban population was determined at the county level, there is no way to directly determine the anticipated growth patterns in urban centers when there is more than one urban center in a county. The existing population projection data base was extended to the necessary population projection data base through a sequence of manipulations and extrapolations. An expected 1995 population and an expected percent urban population for each county was developed using the socalled Spindletop data (i.e. the data from the previously noted report). Arithmetic plots of the Spindletop data were prepared, and the 1995 values read directly from the resulting graphs. No distinction was made between counties totally and partially in the River Basin. It should be noted that, based on the above criteria, that percent urban population data was not available for all counties.

Subsequent to the above 1970 percent urban value for each county was calculated using the population for all urban areas within a county, including those with less than 2,500 residents, i.e., using the definition of urban as specified for ADAPT. The ADAPT 1970 percent urban value was plotted on the same graph as the Spindletop percent urban data described above. The Spindletop data curve was superimposed on the ADAPT 1970 percent urban value, and it was assumed that the second curve would converge to either 100 or zero percent at the same time as the original Spindleton curve. In most of the counties the time of convergence had little or no effect on the shape of the curve over the time increment of interest. The percent urban for the projection years of 1975, 1980, and 1995 was read directly from the second curve.

The previously discussed 1970 enumeration district data was used to determine the fractions of the total county urban and total county rural population resident in the River Basin. Inasmuch as no data indicating low urban and rural areas within a county would change in population the fractional values developed for 1970 were assumed to apply for each projection year. Thus, the urban population within a county and within the River Basin for each projection year was determined by first determining the total county urban population (see above discussion) then applying the fraction of the 1970 county urban population in the River Basin to the total county urban population for the projection year. The procedure for allocating the rural population was identical to that used for the urban population except the rural population rather than urban population values and fractions were used.

A procedure different than the above had to be used for those counties which had one or more incorporated area with less than 2,500 residents each, i.e., those counties for which no urban population projections were available. Based on an analysis of the projected population changes for counties having one urban center of more than 2,500 residents, it was assumed that, for those counties with one or more urban center with less than 2,500 residents each, 85 percent of an increase in population would occur to the urban areas and 15 percent to the rural areas; additionally, it was assumed that a population decrease would occur equally in urban and rural areas. The preceding assumptions were used to allocate population gains/losses among urban and rural areas in those counties for which urban population projections were not available.

For each county or portion of county within the River Basin, the changes in urban and rural population between successive projection years were distributed, on an equal density basis, in the urban and rural areas of each county or portion thereof in the River Basin. In the absence of future land use plans which could be used to define the area over which the projected changes in population should be distributed, the changes in population were assigned to the ADAPT cells associated with the following boundaries for the indicated projection years:

1. Projection years 1975 and 1980 -
   ADAPT cells associated with urban land use, urban enumeration districts, or existing sewer service areas.
2. Projection year 1995 -
   All the ADAPT cells resulting from the above plus those in intensive 201 Planning Areas.

The data base generated by the above described techniques was input to ADAPT and used to produce the accompanying tables and the stream profiles discussed elsewhere in this report.

Exhibit A-2t - Segment Population Trends and Projections, "At Year" and "Between Year" Change

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL										
URBAN										
RURAL										
FARM										
NON-FARM										
SEGMENT NUMBER 1										
TOTAL	40674	41577	42681	46644	902	2.2	1104	2.7	3962	9.3
URBAN	40674	41577	42681	46644	902	2.2	1104	2.7	3962	9.3
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL	9624	9856	10202	11499	231	2.4	346	3.5	1297	12.7
URBAN	9624	9856	10202	11499	231	2.4	346	3.5	1297	12.7
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	31050	31721	32479	35145	670	2.2	757	2.4	2665	8.2
URBAN	31050	31721	32479	35145	670	2.2	757	2.4	2665	8.2
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-FARM	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 2										
TOTAL	26539	27751	29152	34779	1212	4.6	1400	5.0	5627	19.3
URBAN	18838	20020	21594	27276	1181	6.3	1574	7.9	5683	26.3
RURAL	7700	7731	7557	7501	30	0.4	-173	-2.2	-55	-0.7
FARM	2329	2343	2307	2400	13	0.6	-36	-1.5	93	4.1
NON-FARM	5371	5388	5251	5101	17	0.3	-137	-2.6	-149	-2.8
CAMPBELL COUNTY										
TOTAL	15958	16728	17489	20981	770	4.8	760	4.5	3492	20.0
URBAN	12353	13006	13986	17630	652	5.3	973	7.5	3650	26.1
RURAL	3604	3722	3509	3350	118	3.3	-213	-5.7	-158	-4.5
FARM	851	878	828	791	27	3.3	-50	-5.7	-37	-4.5
NON-FARM	2754	2844	2681	2560	90	3.3	-162	-5.7	-121	-4.5
KENTON COUNTY										
TOTAL	8365	8768	9357	11158	402	4.8	589	6.7	1800	19.2
URBAN	5923	6423	6990	8979	500	8.5	566	8.8	1989	28.5
RURAL	2443	2344	2366	2178	-98	-4.0	23	1.0	-189	-8.0
FARM	513	492	497	457	-20	-4.0	4	1.0	-39	-8.0
NON-FARM	1930	1852	1871	1721	-77	-4.0	18	1.0	-149	-8.0
PENDLETON COUNTY										
TOTAL	2216	2255	2300	2641	39	1.8	50	2.2	335	14.5
URBAN	563	591	625	668	28	5.1	34	5.8	43	6.9
RURAL	1653	1664	1680	1973	10	0.7	16	1.0	292	17.4
FARM	966	972	981	1152	6	0.7	9	1.0	170	17.4
NON-FARM	688	692	699	821	4	0.7	6	1.0	121	17.4

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 3										
TOTAL	51587	57859	65394	90460	6271	12.2	7535	13.0	25066	38.3
URBAN	45883	52303	59796	85380	6419	14.0	7493	14.3	25584	42.8
RURAL	5704	5556	5598	5080	-146	-2.6	41	0.8	-517	-9.3
FARM	1230	1206	1215	1102	-30	-2.4	9	0.8	-113	-9.3
NON-FARM	4468	4350	4383	3978	-118	-2.6	32	0.8	-404	-9.2
BOONE COUNTY										
TOTAL	3655	4590	5857	9549	934	25.6	1267	27.6	3692	63.1
URBAN	3267	4192	5455	9195	924	28.3	1263	30.1	3740	68.6
RURAL	387	398	402	355	10	2.7	4	1.0	-47	-11.8
FARM	120	123	124	110	3	2.7	1	1.0	-14	-11.8
NON-FARM	268	275	278	245	7	2.7	2	1.0	-32	-11.8
KENTON COUNTY										
TOTAL	47932	53269	59537	80911	5336	11.1	6268	11.8	21374	35.9
URBAN	42615	48111	54341	76186	5495	12.9	6230	12.9	21844	40.2
RURAL	5317	5156	5196	4725	-158	-3.0	37	0.7	-470	-9.1
FARM	1117	1083	1091	992	-33	-3.0	7	0.7	-98	-9.1
NON-FARM	4200	4075	4105	3733	-125	-3.0	29	0.7	-371	-9.1

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 4										
TOTAL	2895	3206	3624	4909	311	10.8	417	13.0	1285	35.5
URBAN	653	1012	1417	2844	359	55.0	405	40.1	1426	100.7
RURAL	2242	2195	2206	2065	-47	-2.1	11	0.5	-141	-6.4
FARM	471	461	463	434	-10	-2.1	2	0.5	-29	-6.4
NON-FARM	1771	1734	1743	1631	-37	-2.1	8	0.5	-111	-6.4
KENTON COUNTY										
TOTAL	2895	3206	3624	4909	311	10.8	417	13.0	1285	35.5
URBAN	653	1012	1417	2844	359	55.0	405	40.1	1426	100.7
RURAL	2242	2195	2206	2065	-47	-2.1	11	0.5	-141	-6.4
FARM	471	461	463	434	-10	-2.1	2	0.5	-29	-6.4
NON-FARM	1771	1734	1743	1631	-37	-2.1	8	0.5	-111	-6.4

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 5										
TOTAL	1058	1138	1212	1564	80	7.6	73	6.5	352	29.1
URBAN	364	450	549	919	86	17.4	98	21.8	370	67.6
RURAL	674	688	663	645	13	2.0	-24	-3.6	-18	-2.8
FARM	159	162	157	152	3	2.0	-5	-3.0	-4	-2.8
NON-FARM	515	526	507	493	10	2.0	-16	-3.0	-13	-2.8
CAMPBELL COUNTY										
TOTAL	1058	1138	1212	1564	80	7.6	73	6.5	352	29.1
URBAN	364	450	549	919	86	17.4	98	21.8	370	67.6
RURAL	674	688	663	645	13	2.0	-24	-3.6	-18	-2.8
FARM	159	162	157	152	3	2.0	-5	-3.0	-4	-2.8
NON-FARM	515	526	507	493	10	2.0	-16	-3.0	-13	-2.8

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 6										
TOTAL	1388	1308	1327	1091	-79	-5.7	18	1.4	-235	-17.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1388	1308	1327	1091	-79	-5.7	18	1.4	-235	-17.8
FARM	291	275	279	229	-16	-5.7	3	1.4	-49	-17.8
NON-FARM	1096	1034	1049	862	-62	-5.7	14	1.4	-186	-17.8
KENTON COUNTY										
TOTAL	1388	1308	1327	1091	-79	-5.7	18	1.4	-235	-17.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1388	1308	1327	1091	-79	-5.7	18	1.4	-235	-17.8
FARM	291	275	279	229	-16	-5.7	3	1.4	-49	-17.8
NON-FARM	1096	1034	1049	862	-62	-5.7	14	1.4	-186	-17.8

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 7										
TOTAL	2371	2369	2686	9553	-1	-0.1	316	13.4	6866	255.7
URBAN	522	718	987	1782	196	37.6	268	37.3	794	80.6
RURAL	1848	1651	1699	7771	-197	-10.7	48	2.9	6071	357.4
FARM	391	350	360	1881	-41	-10.6	10	2.9	1521	422.7
NON-FARM	1457	1301	1339	5890	-156	-10.7	38	2.9	4550	339.8
BOONE COUNTY										
TOTAL	551	749	1018	4299	198	35.9	268	35.9	3281	322.3
URBAN	522	716	987	1782	196	37.6	268	37.3	794	80.6
RURAL	29	31	31	2518	1	6.5	0	2.4	2486	*****
FARM	9	9	10	778	0	6.5	0	2.4	768	*****
NON-FARM	20	21	22	1740	1	6.5	0	2.4	1718	*****
KENTON COUNTY										
TOTAL	1820	1620	1668	5253	-199	-11.0	47	2.9	3585	215.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1820	1620	1668	5253	-199	-11.0	47	2.9	3585	215.0
FARM	382	340	350	1103	-41	-11.0	9	2.9	752	215.0
NON-FARM	1438	1280	1318	4150	-157	-11.0	37	2.9	2832	215.0

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 8										
TOTAL	1095	1156	1045	962	62	5.7	-112	-9.7	-83	-8.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1095	1158	1045	962	62	5.7	-112	-9.7	-83	-8.0
FARM	259	273	247	227	14	5.7	-26	-9.7	-19	-8.0
NON-FARM	837	884	799	735	47	5.7	-85	-9.7	-63	-8.0
CAMPBELL COUNTY										
TOTAL	1095	1158	1045	962	62	5.7	-112	-9.7	-83	-8.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1095	1158	1045	962	62	5.7	-112	-9.7	-83	-8.0
FARM	259	273	247	227	14	5.7	-26	-9.7	-19	-8.0
NON-FARM	837	884	799	735	47	5.7	-85	-9.7	-63	-8.0

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 9										
TOTAL	5450	5480	5651	6007	23	0.4	171	3.1	356	6.3
URBAN	1422	1513	1627	1936	90	6.4	114	7.5	309	19.0
RURAL	4034	3967	4024	4071	-67	-1.7	56	1.4	46	1.2
FARM	2225	2221	2248	2402	-3	-0.2	26	1.2	154	6.9
NON-FARM	1809	1746	1776	1668	-63	-3.5	30	1.7	-107	-6.1
GRANT COUNTY										
TOTAL	2984	3085	3211	3724	100	3.4	126	4.1	512	16.0
URBAN	1422	1513	1627	1936	90	6.4	114	7.5	309	19.0
RURAL	1563	1572	1585	1788	9	0.6	12	0.8	203	12.8
FARM	1103	1110	1119	1262	6	0.6	8	0.8	143	12.8
NON-FARM	459	462	466	526	2	0.6	3	0.8	59	12.8
KENTON COUNTY										
TOTAL	801	768	790	516	-92	-10.7	22	2.9	-273	-34.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	801	768	790	516	-92	-10.7	22	2.9	-273	-34.7
FARM	181	161	166	108	-19	-10.7	4	2.9	-57	-34.7
NON-FARM	680	607	624	408	-73	-10.7	17	2.9	-216	-34.7
PENDLETON COUNTY										
TOTAL	1611	1627	1649	1706	15	1.0	22	1.4	117	7.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1611	1627	1649	1706	15	1.0	22	1.4	117	7.1
FARM	941	950	963	1032	9	1.0	13	1.4	68	7.1
NON-FARM	670	677	686	735	6	1.0	9	1.4	48	7.1

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 10										
TOTAL	1006	1016	1029	1098	9	0.9	13	1.3	68	6.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1006	1016	1029	1098	9	0.9	13	1.3	68	6.7
FARM	604	609	617	657	5	0.9	7	1.3	40	6.6
NON-FARM	403	407	412	440	3	0.9	5	1.4	28	6.8
BRACKEN COUNTY										
TOTAL	376	380	382	391	1	0.4	2	0.5	9	2.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	376	380	382	391	1	0.4	2	0.5	9	2.4
FARM	237	238	239	245	0	0.4	1	0.5	5	2.4
NON-FARM	141	142	143	146	0	0.4	0	0.5	3	2.4
PENDLETON COUNTY										
TOTAL	628	636	647	707	7	1.3	11	1.8	59	9.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	628	636	647	707	7	1.3	11	1.8	59	9.2
FARM	367	371	378	413	4	1.3	6	1.8	34	9.2
NON-FARM	261	265	269	294	3	1.3	4	1.8	24	9.2

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 11										
TOTAL	6245	6406	6627	7489	161	2.6	220	3.4	862	13.0
URBAN	2212	2393	2612	2946	181	8.2	219	9.2	353	12.8
RURAL	4034	4014	4015	4543	-20	-0.5	1	0.0	528	13.2
FARM	2501	2488	2488	2806	-13	-0.5	0	-0.0	317	12.6
NON-FARM	1532	1525	1526	1737	-6	-0.4	1	0.1	211	13.8
HARRISON COUNTY										
TOTAL	3369	3410	3483	3839	40	1.2	73	2.2	355	10.2
URBAN	266	337	426	593	71	26.8	88	26.2	167	39.5
RURAL	3103	3073	3056	3245	-30	-1.0	-14	-0.5	187	6.1
FARM	1958	1939	1929	2048	-19	-1.0	-9	-0.5	118	6.1
NON-FARM	1145	1134	1126	1197	-11	-1.0	-5	-0.5	69	6.1
PENDLETON COUNTY										
TOTAL	2876	2997	3143	3650	120	4.2	146	4.9	507	16.1
URBAN	1946	2056	2186	2352	110	5.7	130	6.4	165	7.6
RURAL	930	941	957	1298	10	1.2	15	1.7	341	35.7
FARM	543	550	559	758	6	1.2	9	1.7	199	35.7
NON-FARM	387	391	398	540	4	1.2	6	1.7	142	35.7

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 12										
TOTAL	1487	1529	1583	1759	42	2.8	53	3.5	176	11.1
URBAN	320	349	387	488	29	9.3	37	10.7	101	26.2
RURAL	1167	1180	1196	1271	12	1.1	16	1.4	74	6.2
FARM	787	795	806	855	8	1.1	10	1.4	48	6.0
NON-FARM	380	384	390	416	4	1.1	5	1.5	28	6.7
GRANT COUNTY										
TOTAL	1162	1220	1268	1410	37	3.2	47	3.9	142	11.2
URBAN	320	349	387	488	29	9.3	37	10.7	101	26.2
RURAL	843	871	881	922	8	0.9	10	1.2	41	4.7
FARM	609	615	622	651	5	0.9	7	1.2	29	4.7
NON-FARM	254	256	259	271	2	0.9	2	1.2	12	4.7
PENDLETON COUNTY										
TOTAL	304	309	315	349	4	1.5	6	2.1	33	10.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	304	309	315	349	4	1.5	6	2.1	33	10.6
FARM	178	180	184	204	2	1.5	3	2.1	19	10.6
NON-FARM	127	128	131	145	1	1.5	2	2.1	13	10.6

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 13										
TOTAL	603	614	629	747	10	1.6	14	2.4	116	18.8
URBAN	66	74	83	109	7	11.4	9	12.9	25	30.9
RURAL	537	541	546	639	3	0.6	5	1.0	92	17.0
FARM	361	363	367	430	2	0.6	3	1.0	63	17.4
NON-FARM	176	178	179	208	1	0.6	1	1.0	28	16.1
GRANT COUNTY										
TOTAL	420	431	444	547	10	2.5	13	3.1	103	23.3
URBAN	66	74	83	109	7	11.4	9	12.9	25	30.9
RURAL	354	357	361	438	2	0.8	3	1.0	77	21.6
FARM	250	252	255	310	2	0.8	2	1.0	54	21.6
NON-FARM	104	105	106	129	0	0.8	1	1.0	22	21.6
HARRISON COUNTY										
TOTAL	82	80	80	84	-1	-1.4	0	-0.7	3	4.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	82	80	80	84	-1	-1.4	0	-0.7	3	4.8
FARM	51	51	50	53	0	-1.4	0	-0.7	2	4.8
NON-FARM	30	30	29	31	0	-1.4	0	-0.7	1	4.8
PENDLETON COUNTY										
TOTAL	102	103	105	117	1	1.5	2	2.1	11	10.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	102	103	105	117	1	1.5	2	2.1	11	10.6
FARM	59	60	62	68	0	1.5	1	2.1	6	10.6
NON-FARM	42	43	44	49	0	1.5	0	2.1	4	10.6

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 14										
TOTAL	6467	6945	7545	9726	477	7.4	600	8.6	2181	28.9
URBAN	4982	5470	6075	7227	488	9.8	605	11.1	1151	19.0
RURAL	1486	1475	1470	2499	-10	-0.7	-5	-0.4	1029	70.1
FARM	938	931	927	1577	-6	-0.7	-3	-0.4	649	70.1
NON-FARM	548	544	542	922	-4	-0.7	-1	-0.4	379	70.1
HARRISON COUNTY										
TOTAL	6467	6945	7545	9726	477	7.4	600	8.6	2181	28.9
URBAN	4982	5470	6075	7227	488	9.8	605	11.1	1151	19.0
RURAL	1486	1475	1470	2499	-10	-0.7	-5	-0.4	1029	70.1
FARM	938	931	927	1577	-6	-0.7	-3	-0.4	649	70.1
NON-FARM	548	544	542	922	-4	-0.7	-1	-0.4	379	70.1

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 15										
TOTAL	3467	3519	3605	4139	51	1.5	86	2.5	533	14.8
URBAN	1461	1513	1579	1702	52	3.6	65	4.3	123	7.8
RURAL	2006	2005	2027	2436	0	-0.0	21	1.1	409	20.2
FARM	1148	1147	1157	1401	-1	-0.1	9	0.9	244	21.2
NON-FARM	858	859	870	1035	0	0.1	11	1.3	164	19.0
BOURBON COUNTY										
TOTAL	834	842	867	965	7	0.9	25	3.0	97	11.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	834	842	867	965	7	0.9	25	3.0	97	11.3
FARM	409	412	425	473	3	0.9	12	3.0	47	11.3
NON-FARM	425	429	442	492	3	0.9	12	3.0	49	11.3
HARRISON COUNTY										
TOTAL	2633	2677	2738	3174	44	1.7	61	2.3	435	15.9
URBAN	1461	1513	1579	1702	52	3.6	65	4.3	123	7.8
RURAL	1172	1164	1160	1472	-8	-0.7	-3	-0.3	311	26.9
FARM	739	734	732	929	-5	-0.7	-2	-0.3	196	26.9
NON-FARM	432	429	426	543	-2	-0.7	-1	-0.3	115	26.9

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 16										
TOTAL	15870	17072	18557	22216	1190	7.5	1485	8.7	3659	19.7
URBAN	7825	8871	10135	10777	1046	13.4	1264	14.3	641	6.3
RURAL	8051	8201	8421	11439	149	1.9	220	2.7	3017	35.8
FARM	4086	4149	4245	5535	62	1.5	96	2.3	1289	30.4
NON-FARM	3965	4052	4177	5904	87	2.2	124	3.1	1727	41.4
BATH COUNTY										
TOTAL	725	800	890	990	74	10.3	90	11.3	100	11.3
URBAN	331	403	491	580	72	21.9	87	21.6	89	18.2
RURAL	394	396	399	410	2	0.6	2	0.7	11	2.8
FARM	269	270	272	276	1	0.0	1	0.7	5	2.8
NON-FARM	165	166	168	193	1	0.0	1	0.7	5	2.8
BOURBON COUNTY										
TOTAL	2734	2776	2876	3233	43	1.6	100	3.6	354	12.3
URBAN	791	814	842	919	22	2.9	28	3.5	77	9.2
RURAL	1943	1964	2036	2314	20	1.1	71	3.7	277	13.6
FARM	952	962	998	1134	10	1.1	35	3.7	136	13.6
NON-FARM	991	1002	1038	1180	10	1.1	36	3.7	141	13.6
CLARK COUNTY										
TOTAL	20	21	22	26	0	4.0	1	5.9	3	17.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	20	21	22	26	0	4.0	1	5.9	3	17.9
FARM	8	8	9	10	0	4.0	0	5.9	1	17.9
NON-FARM	12	13	13	16	0	4.0	0	5.9	2	17.9
HARRISON COUNTY										
TOTAL	10	10	15	16	0	-0.7	0	-0.3	0	2.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	16	16	15	16	0	-0.7	0	-0.3	0	2.3
FARM	10	10	10	10	0	-0.7	0	-0.3	0	2.3
NON-FARM	0	0	6	6	0	-0.7	0	-0.3	0	2.3
MONTGOMERY CO										
TOTAL	8566	9643	10900	13828	1075	12.6	1257	13.0	2927	26.9
URBAN	5114	6064	7178	7537	949	18.6	1114	18.4	359	5.0
RURAL	3454	3580	3722	6291	125	3.6	142	4.0	2568	69.0
FARM	1399	1450	1507	2546	50	3.6	57	4.0	1040	69.0
NON-FARM	2055	2130	2215	3743	74	3.6	84	4.0	1528	69.0
NICHOLAS COUNTY										
TOTAL	3814	3815	3851	4124	1	0.0	36	1.0	272	7.1
URBAN	1589	1590	1624	1741	1	0.1	33	2.1	116	7.2
RURAL	2225	2225	2227	2383	0	0.0	2	0.1	155	7.0
FARM	1508	1508	1510	1616	0	0.0	1	0.1	105	7.0
NON-FARM	716	716	717	767	0	0.0	0	0.1	50	7.0

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 17										
TOTAL	12452	12778	13236	15030	325	2.6	458	3.6	1793	13.6
URBAN	7941	8242	8612	9621	300	3.8	370	4.5	1009	11.7
RURAL	4511	4536	4624	5409	25	0.6	87	1.9	784	17.0
FARM	2210	2223	2266	2650	12	0.6	43	1.9	384	17.0
NON-FARM	2300	2313	2358	2759	12	0.6	44	1.9	400	17.0
BOURBON COUNTY										
TOTAL	12452	12778	13236	15030	325	2.6	458	3.6	1793	13.6
URBAN	7941	8242	8612	9621	300	3.8	370	4.5	1009	11.7
RURAL	4511	4536	4624	5409	25	0.6	87	1.9	784	17.0
FARM	2210	2223	2266	2650	12	0.6	43	1.9	384	17.0
NON-FARM	2300	2313	2358	2759	12	0.6	44	1.9	400	17.0

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 18										
TOTAL	3036	3209	3460	4335	170	5.6	251	7.8	875	25.3
URBAN	49	147	268	596	97	197.6	120	81.8	328	122.6
RURAL	2986	3062	3193	3740	73	2.4	131	4.3	546	17.1
FARM	1275	1305	1361	1601	30	2.4	55	4.3	240	17.6
NON-FARM	1711	1756	1832	2139	43	2.5	75	4.3	306	16.7
BOURBON COUNTY										
TOTAL	950	1064	1220	1788	106	11.3	156	14.7	567	46.5
URBAN	49	147	268	596	97	197.6	120	81.8	328	122.6
RURAL	900	917	953	1192	10	1.1	35	3.9	239	25.2
FARM	444	449	467	584	5	1.1	17	3.9	117	25.2
NON-FARM	462	467	486	608	5	1.1	18	3.9	122	25.2
CLARK COUNTY										
TOTAL	2040	2100	2193	2491	60	3.0	92	4.4	297	13.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2040	2100	2193	2491	60	3.0	92	4.4	297	13.6
FARM	814	838	875	994	24	3.0	36	4.4	118	13.6
NON-FARM	1226	1262	1318	1497	36	3.0	55	4.4	178	13.6
MONTGOMERY CO										
TOTAL	42	45	47	57	2	5.3	2	5.7	9	20.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	42	45	47	57	2	5.3	2	5.7	9	20.1
FARM	17	18	19	23	0	5.3	1	5.7	3	20.1
NON-FARM	25	27	28	34	1	5.3	1	5.7	5	20.1

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 19										
TOTAL	544	586	640	817	41	7.7	53	9.2	177	27.8
URBAN	439	480	530	668	40	9.3	50	10.5	137	25.9
RURAL	105	106	109	150	1	1.0	3	3.3	40	37.1
FARM	51	52	54	73	0	1.0	1	3.3	19	37.1
NON-FARM	53	54	56	76	0	1.0	1	3.3	20	37.1
BOURBON COUNTY										
TOTAL	544	586	640	817	41	7.7	53	9.2	177	27.8
URBAN	439	480	530	668	40	9.3	50	10.5	137	25.9
RURAL	105	106	109	150	1	1.0	3	3.3	40	37.1
FARM	51	52	54	73	0	1.0	1	3.3	19	37.1
NON-FARM	53	54	56	76	0	1.0	1	3.3	20	37.1

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 20										
TOTAL	12466	13532	14691	19760	1063	8.5	1356	10.0	4869	32.7
URBAN	9480	10476	11716	13004	996	10.5	1240	11.8	1287	11.0
RURAL	2988	3056	3174	6756	67	2.3	118	3.9	3581	112.8
FARM	1279	1307	1357	2796	27	2.2	49	3.8	1438	106.0
NON-FARM	1709	1749	1816	3961	39	2.3	68	3.9	2143	117.9
BOURBON COUNTY										
TOTAL	956	964	991	1097	7	0.8	27	2.8	106	10.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	956	964	991	1097	7	0.8	27	2.8	106	10.7
FARM	466	472	486	538	3	0.8	13	2.8	51	10.7
NON-FARM	467	492	506	560	4	0.8	13	2.8	54	10.7
CLARK COUNTY										
TOTAL	11513	12568	13699	18663	1055	9.2	1331	10.6	4763	34.3
URBAN	9480	10476	11716	13004	996	10.5	1240	11.8	1287	11.0
RURAL	2032	2092	2163	5659	59	2.9	91	4.4	3475	159.2
FARM	811	835	871	2258	23	2.9	36	4.4	1386	159.2
NON-FARM	1221	1257	1312	3401	35	2.9	54	4.4	2088	159.2

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 21										
TOTAL	1620	1672	1739	1684	52	3.2	66	4.0	145	8.4
URBAN	653	701	757	828	47	7.2	56	8.0	71	9.4
RURAL	966	972	982	1056	5	0.5	10	1.1	74	7.5
FARM	580	583	589	633	2	0.5	6	1.1	43	7.4
NON-FARM	386	389	393	423	2	0.6	4	1.2	30	7.7
BRACKEN COUNTY										
TOTAL	25	25	25	26	0	0.5	0	0.7	0	3.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	25	25	25	26	0	0.5	0	0.7	0	3.0
FARM	15	16	16	16	0	0.5	0	0.7	0	3.0
NON-FARM	9	9	9	10	0	0.5	0	0.7	0	3.0
HARRISON COUNTY										
TOTAL	314	310	309	320	-3	-1.0	-1	-0.5	10	3.5
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	314	310	309	320	-3	-1.0	-1	-0.5	10	3.5
FARM	198	196	195	202	-2	-1.0	0	-0.5	6	3.5
NON-FARM	116	115	114	118	-1	-1.0	0	-0.5	3	3.5
PENDLETON COUNTY										
TOTAL	1262	1337	1405	1539	55	4.3	68	5.1	133	9.5
URBAN	653	701	757	828	47	7.2	56	8.0	71	9.4
RURAL	626	636	649	711	8	1.3	12	1.9	62	9.7
FARM	367	372	379	415	4	1.3	7	1.9	36	9.7
NON-FARM	261	265	270	296	3	1.3	5	1.9	26	9.7

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 22										
TOTAL	303	307	312	339	3	1.2	5	1.7	27	8.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	303	307	312	339	3	1.2	5	1.7	27	8.7
FARM	177	179	182	196	2	1.2	3	1.7	15	8.7
NON-FARM	126	128	130	141	1	1.2	2	1.7	11	8.7
PENDLETON COUNTY										
TOTAL	303	307	312	339	3	1.2	5	1.7	27	8.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	303	307	312	339	3	1.2	5	1.7	27	8.7
FARM	177	179	182	196	2	1.2	3	1.7	15	8.7
NON-FARM	126	128	130	141	1	1.2	2	1.7	11	8.7

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 23										
TOTAL	5226	5173	5119	5044	-53	-1.0	-53	-1.0	-74	-1.5
URBAN	715	727	751	758	12	1.7	23	3.2	7	1.0
RURAL	4511	4445	4369	4287	-65	-1.5	-76	-1.7	-82	-1.9
FARM	2395	2366	2331	2325	-28	-1.2	-34	-1.5	-6	-0.3
NON-FARM	2116	2079	2037	1961	-36	-1.7	-42	-2.0	-75	-3.7
BRACKEN COUNTY										
TOTAL	2026	2053	2093	2277	26	1.3	40	2.0	183	8.8
URBAN	436	456	487	520	20	4.6	31	6.8	32	6.6
RURAL	1590	1597	1606	1757	6	0.4	9	0.6	150	9.4
FARM	995	999	1005	1100	4	0.4	6	0.6	94	9.4
NON-FARM	595	597	601	657	2	0.4	3	0.6	56	9.4
MASON COUNTY										
TOTAL	2646	2573	2490	2228	-73	-2.8	-82	-3.2	-262	-10.5
URBAN	279	271	263	238	-7	-2.8	-7	-2.9	-25	-9.6
RURAL	2367	2301	2227	1990	-65	-2.8	-74	-3.2	-237	-10.7
FARM	1035	1006	973	870	-28	-2.8	-32	-3.2	-103	-10.7
NON-FARM	1333	1296	1254	1120	-37	-2.8	-41	-3.2	-133	-10.7
ROBERTSON CO										
TOTAL	553	547	535	539	-5	-1.1	-11	-2.2	4	0.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	553	547	535	539	-5	-1.1	-11	-2.2	4	0.8
FARM	365	361	353	355	-3	-1.1	-7	-2.2	2	0.8
NON-FARM	189	187	183	184	-2	-1.1	-4	-2.2	1	0.8

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 24										
TOTAL	278	269	258	225	-9	-3.3	-10	-3.9	-33	-12.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	278	269	258	225	-9	-3.3	-10	-3.9	-33	-12.9
FARM	121	117	113	98	-4	-3.3	-4	-3.9	-14	-12.9
NON-FARM	156	151	145	127	-5	-3.3	-5	-3.9	-18	-12.9
MASON COUNTY										
TOTAL	278	269	258	225	-9	-3.3	-10	-3.9	-33	-12.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	278	269	258	225	-9	-3.3	-10	-3.9	-33	-12.9
FARM	121	117	113	98	-4	-3.3	-4	-3.9	-14	-12.9
NON-FARM	156	151	145	127	-5	-3.3	-5	-3.9	-18	-12.9

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 25										
TOTAL	633	619	604	559	-13	-2.1	-14	-2.4	-45	-7.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	633	619	604	559	-13	-2.1	-14	-2.4	-45	-7.6
FARM	308	302	295	276	-5	-1.9	-6	-2.2	-19	-6.7
NON-FARM	325	317	309	283	-7	-2.3	-8	-2.6	-25	-8.3
FLEMING COUNTY										
TOTAL	197	196	196	196	0	-0.2	0	-0.2	0	0.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	197	196	196	196	0	-0.2	0	-0.2	0	0.2
FARM	117	117	117	117	0	-0.2	0	-0.2	0	0.2
NON-FARM	79	79	79	79	0	-0.2	0	-0.2	0	0.2
MASON COUNTY										
TOTAL	436	423	409	363	-12	-2.9	-14	-3.4	-46	-11.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	436	423	409	363	-12	-2.9	-14	-3.4	-46	-11.3
FARM	191	185	179	158	-5	-2.9	-6	-3.4	-20	-11.3
NON-FARM	245	236	230	204	-7	-2.9	-8	-3.4	-25	-11.3

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 26										
TOTAL	2915	2881	2844	2723	-34	-1.2	-37	-1.3	-120	-4.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2915	2881	2844	2723	-34	-1.2	-37	-1.3	-120	-4.2
FARM	1681	1665	1648	1592	-15	-0.9	-16	-1.0	-56	-3.4
NON-FARM	1234	1216	1196	1131	-18	-1.5	-20	-1.7	-64	-5.4
FLEMING COUNTY										
TOTAL	584	583	582	583	-1	-0.2	-1	-0.2	0	0.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	584	583	582	583	-1	-0.2	-1	-0.2	0	0.2
FARM	349	348	347	348	0	-0.2	0	-0.2	0	0.2
NON-FARM	235	235	235	235	0	-0.2	0	-0.2	0	0.2
LEWIS COUNTY										
TOTAL	831	829	826	816	-1	-0.2	-1	-0.1	-10	-1.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	831	829	826	816	-1	-0.2	-1	-0.1	-10	-1.2
FARM	676	675	674	666	-1	-0.2	0	-0.1	-8	-1.2
NON-FARM	155	154	154	152	0	-0.2	0	-0.1	-1	-1.2
MASON COUNTY										
TOTAL	1500	1469	1434	1322	-31	-2.1	-34	-2.4	-111	-7.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1500	1469	1434	1322	-31	-2.1	-34	-2.4	-111	-7.8
FARM	655	642	626	578	-13	-2.1	-15	-2.4	-48	-7.8
NON-FARM	844	827	807	744	-17	-2.1	-19	-2.4	-62	-7.8

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 27										
TOTAL	503	496	488	462	-7	-1.4	-8	-1.6	-25	-5.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	503	496	488	462	-7	-1.4	-8	-1.6	-25	-5.3
FARM	220	217	213	202	-3	-1.4	-3	-1.6	-11	-5.3
NON-FARM	283	279	275	260	-4	-1.4	-4	-1.6	-14	-5.3
MASON COUNTY										
TOTAL	503	496	488	462	-7	-1.4	-8	-1.6	-25	-5.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	503	496	488	462	-7	-1.4	-8	-1.6	-25	-5.3
FARM	220	217	213	202	-3	-1.4	-3	-1.6	-11	-5.3
NON-FARM	283	279	275	260	-4	-1.4	-4	-1.6	-14	-5.3

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 28										
TOTAL	10541	10477	10399	11021	-64	-0.6	-77	-0.7	621	6.0
URBAN	502	465	423	460	-37	-7.4	-42	-9.1	56	13.5
RURAL	10039	10012	9976	10541	-27	-0.3	-35	-0.4	564	5.7
FARM	6000	5981	5958	6273	-18	-0.3	-22	-0.4	314	5.3
NON-FARM	4040	4031	4018	4268	-8	-0.2	-12	-0.3	249	6.2
BATH COUNTY										
TOTAL	1278	1285	1293	1869	7	0.5	8	0.7	576	44.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1278	1285	1293	1869	7	0.5	8	0.7	576	44.6
FARM	677	681	685	991	3	0.5	4	0.7	305	44.6
NON-FARM	600	604	608	879	3	0.5	4	0.7	270	44.6
BRACKEN COUNTY										
TOTAL	26	26	26	29	0	0.5	0	0.7	0	3.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	26	26	26	29	0	0.5	0	0.7	0	3.0
FARM	17	17	16	18	0	0.4	0	0.7	0	3.0
NON-FARM	10	10	11	11	0	0.5	0	0.7	0	3.0
FLEMING COUNTY										
TOTAL	2530	2523	2515	2527	-7	-0.3	-7	-0.3	11	0.5
URBAN	16	13	10	17	-2	-18.5	-3	-25.1	7	78.8
RURAL	2515	2510	2506	2509	-4	-0.2	-4	-0.2	3	0.2
FARM	1501	1499	1496	1498	-2	-0.2	-2	-0.2	2	0.2
NON-FARM	1013	1012	1010	1011	-1	-0.2	-1	-0.2	1	0.2
HARRISON COUNTY										
TOTAL	1276	1265	1259	1302	-12	-1.0	-6	-0.5	42	3.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1276	1265	1259	1302	-12	-1.0	-6	-0.5	42	3.4
FARM	800	796	794	821	-8	-1.0	-3	-0.5	26	3.4
NON-FARM	472	467	465	480	-4	-1.0	-2	-0.5	15	3.4
MASON COUNTY										
TOTAL	563	565	545	482	-17	-3.1	-19	-3.5	-63	-11.7
URBAN	45	43	42	38	-1	-2.7	-1	-2.7	-3	-9.0
RURAL	539	522	503	443	-16	-3.1	-18	-3.6	-59	-11.9
FARM	235	228	220	194	-7	-3.1	-8	-3.6	-26	-11.9
NON-FARM	303	294	283	250	-9	-3.1	-10	-3.6	-33	-11.9
NICHOLAS COUNTY										
TOTAL	2670	2670	2674	2744	0	0.0	3	0.1	70	2.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2670	2670	2674	2744	0	0.0	3	0.1	70	2.6
FARM	1810	1810	1813	1860	0	0.0	2	0.1	47	2.6
NON-FARM	860	860	861	884	0	0.0	1	0.1	22	2.6
ROBERTSON CO										
TOTAL	1610	1504	1500	1495	-46	-2.9	-64	-4.1	-5	-0.3
URBAN	442	409	371	424	-32	-7.5	-38	-9.3	53	14.3
RURAL	1168	1155	1129	1070	-13	-1.1	-26	-2.3	-58	-5.2
FARM	770	761	744	705	-8	-1.1	-17	-2.3	-38	-5.2
NON-FARM	398	394	385	365	-4	-1.1	-8	-2.3	-19	-5.2
ROWAN COUNTY										
TOTAL	565	577	565	574	12	2.1	8	1.4	-11	-1.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	565	577	565	574	12	2.1	8	1.4	-11	-1.9
FARM	182	186	189	185	3	2.1	2	1.4	-3	-1.9
NON-FARM	382	391	396	389	8	2.1	5	1.4	-7	-1.9

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 29										
TOTAL	5134	5113	5089	5182	-21	-0.4	-23	-0.5	92	1.8
URBAN	2497	2481	2463	2505	-16	-0.6	-17	-0.7	41	1.7
RURAL	2637	2632	2626	2677	-5	-0.2	-5	-0.2	50	1.9
FARM	1576	1573	1570	1600	-3	-0.2	-3	-0.2	30	1.9
NON-FARM	1061	1059	1057	1077	-2	-0.2	-2	-0.2	20	1.9
FLEMING COUNTY										
TOTAL	5110	5089	5065	5157	-21	-0.4	-23	-0.5	92	1.8
URBAN	2497	2481	2463	2505	-16	-0.6	-17	-0.7	41	1.7
RURAL	2613	2608	2602	2653	-5	-0.2	-5	-0.2	50	1.9
FARM	1500	1557	1554	1584	-3	-0.2	-3	-0.2	29	1.9
NON-FARM	1053	1051	1049	1069	-2	-0.2	-2	-0.2	20	1.9
NICHOLAS COUNTY										
TOTAL	24	24	24	25	0	0.0	0	0.2	0	3.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	24	24	24	25	0	0.0	0	0.2	0	3.2
FARM	16	16	16	17	0	0.0	0	0.2	0	3.2
NON-FARM	8	8	8	8	0	0.0	0	0.2	0	3.2

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 30										
TOTAL	704	703	701	702	-1	-0.3	-1	-0.3	1	0.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	704	703	701	702	-1	-0.3	-1	-0.3	1	0.2
FARM	421	420	418	419	-1	-0.3	-1	-0.3	0	0.2
NON-FARM	284	283	282	283	0	-0.3	0	-0.3	0	0.2
FLEMING COUNTY										
TOTAL	704	703	701	702	-1	-0.3	-1	-0.3	1	0.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	704	703	701	702	-1	-0.3	-1	-0.3	1	0.2
FARM	421	420	418	419	-1	-0.3	-1	-0.3	0	0.2
NON-FARM	284	283	282	283	0	-0.3	0	-0.3	0	0.2

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 31										
TOTAL	2240	2234	2227	2233	-6	-0.3	-6	-0.3	5	0.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2240	2234	2227	2233	-6	-0.3	-6	-0.3	5	0.3
FARM	1336	1334	1330	1333	-3	-0.3	-4	-0.3	3	0.3
NON-FARM	903	900	898	900	-2	-0.3	-2	-0.3	2	0.3
FLEMING COUNTY										
TOTAL	2240	2234	2227	2233	-6	-0.3	-6	-0.3	5	0.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2240	2234	2227	2233	-6	-0.3	-6	-0.3	5	0.3
FARM	1336	1334	1330	1333	-3	-0.3	-4	-0.3	3	0.3
NON-FARM	903	900	898	900	-2	-0.3	-2	-0.3	2	0.3

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 32										
TOTAL	9598	9902	10254	13647	303	3.2	352	3.6	3393	33.1
URBAN	1411	1516	1645	1776	106	7.5	127	8.4	130	7.9
RURAL	8187	8386	8608	11872	197	2.4	224	2.7	3263	37.9
FARM	3725	3807	3900	5248	81	2.2	93	2.4	1347	34.6
NON-FARM	4462	4577	4708	6624	115	2.6	131	2.9	1915	40.7
BATH COUNTY										
TOTAL	4275	4397	4544	4884	121	2.9	146	3.3	340	7.5
URBAN	1411	1516	1645	1776	106	7.5	127	8.4	130	7.9
RURAL	2864	2880	2899	3109	15	0.5	18	0.7	209	7.2
FARM	1518	1526	1536	1646	8	0.5	10	0.7	111	7.2
NON-FARM	1346	1354	1362	1461	7	0.5	8	0.7	98	7.2
BENIFER COUNTY										
TOTAL	915	916	916	918	0	0.0	0	0.0	1	0.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	915	916	916	918	0	0.0	0	0.0	1	0.2
FARM	422	422	422	423	0	0.0	0	0.0	0	0.2
NON-FARM	493	494	494	495	0	0.0	0	0.0	0	0.2
MONTGOMERY CO										
TOTAL	4407	4589	4794	7846	181	4.1	205	4.5	3052	63.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.
RURAL	4407	4589	4794	7846	181	4.1	205	4.5	3052	63.7
FARM	1705	1858	1941	3178	73	4.1	83	4.5	1236	63.7
NON-FARM	2622	2730	2852	4668	107	4.1	121	4.5	1816	63.7

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 33										
TOTAL	1388	1400	1414	1468	12	0.9	14	1.0	54	3.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1388	1400	1414	1468	12	0.9	14	1.0	54	3.8
FARM	717	723	730	756	5	0.8	6	1.0	26	3.6
NON-FARM	670	677	684	712	6	0.9	7	1.1	27	4.1
BATH COUNTY										
TOTAL	1243	1250	1259	1293	7	0.6	8	0.7	34	2.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1243	1250	1259	1293	7	0.6	8	0.7	34	2.7
FARM	659	663	667	685	3	0.6	4	0.7	18	2.7
NON-FARM	584	588	592	608	3	0.6	4	0.7	16	2.7
MONTGOMERY CO										
TOTAL	145	150	155	175	4	3.3	5	3.6	20	12.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	145	150	155	175	4	3.3	5	3.6	20	12.9
FARM	59	61	63	71	1	3.3	2	3.6	8	12.9
NON-FARM	86	89	92	104	2	3.3	3	3.6	11	12.9

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 34										
TOTAL	1585	1651	1730	1931	65	4.1	78	4.8	200	11.6
URBAN	20	79	150	223	59	293.4	71	89.6	72	48.3
RURAL	1565	1572	1580	1708	6	0.4	7	0.5	128	8.1
FARM	811	814	818	886	3	0.4	4	0.5	67	8.3
NON-FARM	754	757	761	821	3	0.4	3	0.5	60	7.9
BATH COUNTY										
TOTAL	1315	1380	1459	1659	65	5.0	78	5.7	200	13.7
URBAN	20	79	150	223	59	293.4	71	89.6	72	48.3
RURAL	1294	1301	1308	1436	6	0.5	7	0.6	127	9.7
FARM	686	689	693	761	3	0.5	4	0.6	67	9.7
NON-FARM	608	611	615	675	2	0.5	3	0.6	59	9.7
MENIFEE COUNTY										
TOTAL	271	271	271	272	0	0.1	0	0.1	0	0.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	271	271	271	272	0	0.1	0	0.1	0	0.3
FARM	125	125	125	125	0	0.1	0	0.1	0	0.3
NON-FARM	146	146	146	146	0	0.1	0	0.1	0	0.3

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 35										
TOTAL	14181	15542	16957	21284	1360	9.6	1414	9.1	4327	25.5
URBAN	7461	8667	9978	10995	1206	16.2	1310	15.1	1017	10.2
RURAL	6720	6874	6979	10289	154	2.3	104	1.5	3309	47.4
FARM	2171	2220	2254	3323	49	2.3	33	1.5	1069	47.4
NON-FARM	4550	4654	4725	6965	104	2.3	70	1.5	2240	47.4
ROWAN COUNTY										
TOTAL	14181	15542	16957	21284	1360	9.6	1414	9.1	4327	25.5
URBAN	7461	8667	9978	10995	1206	16.2	1310	15.1	1017	10.2
RURAL	6720	6874	6979	10289	154	2.3	104	1.5	3309	47.4
FARM	2171	2220	2254	3323	49	2.3	33	1.5	1069	47.4
NON-FARM	4550	4654	4725	6965	104	2.3	70	1.5	2240	47.4

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 30										
TOTAL	12436	12550	12714	13130	119	1.0	156	1.3	416	3.3
URBAN	1367	1307	1262	1143	-80	-5.8	-45	-3.4	-119	-9.5
RURAL	11046	11246	11452	11986	199	1.8	203	1.8	535	4.7
FARM	4956	5033	5104	5292	65	1.3	70	1.4	187	3.7
NON-FARM	6066	6215	6346	6696	134	2.2	132	2.1	348	5.5
BATH COUNTY										
TOTAL	400	403	407	454	3	0.8	3	1.0	47	11.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	400	403	407	454	3	0.8	3	1.0	47	11.6
FARM	212	214	216	241	1	0.8	2	1.0	25	11.6
NON-FARM	188	189	191	213	1	0.8	1	1.0	22	11.6
ELLIOTT COUNTY										
TOTAL	365	364	364	363	-1	-0.3	0	0.0	-1	-0.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	365	364	364	363	-1	-0.3	0	0.0	-1	-0.3
FARM	201	200	200	200	0	-0.3	0	0.0	0	-0.3
NON-FARM	164	164	164	163	0	-0.3	0	0.0	0	-0.3
MAGOFFIN COUNTY										
TOTAL	2400	2647	2830	3363	180	7.3	182	6.9	533	18.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2400	2647	2830	3363	180	7.3	182	6.9	533	18.9
FARM	925	993	1061	1261	67	7.3	68	6.9	200	18.9
NON-FARM	1541	1654	1769	2102	112	7.3	114	6.9	333	18.9
MENIFEE COUNTY										
TOTAL	500	501	501	503	0	0.1	0	0.1	1	0.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	500	501	501	503	0	0.1	0	0.1	1	0.3
FARM	231	231	231	232	0	0.1	0	0.1	0	0.3
NON-FARM	270	270	270	271	0	0.1	0	0.1	0	0.3
MORGAN COUNTY										
TOTAL	6702	6575	6504	6266	-127	-1.9	-71	-1.1	-237	-3.6
URBAN	1367	1307	1262	1143	-80	-5.8	-45	-3.4	-119	-9.5
RURAL	5335	5268	5241	5124	-47	-0.9	-26	-0.5	-117	-2.2
FARM	2753	2729	2715	2654	-24	-0.9	-13	-0.5	-60	-2.2
NON-FARM	2582	2539	2526	2470	-22	-0.9	-12	-0.5	-56	-2.2
ROWAN COUNTY										
TOTAL	2003	2066	2109	2181	63	3.2	43	2.1	71	3.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	2003	2066	2109	2181	63	3.2	43	2.1	71	3.4
FARM	647	667	681	705	20	3.2	13	2.1	23	3.4
NON-FARM	1356	1399	1428	1477	43	3.2	29	2.1	46	3.4

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 37										
TOTAL	1451	1469	1480	1530	17	1.2	11	0.8	49	3.4
URBAN	480	497	508	519	16	3.5	10	2.2	10	2.2
RURAL	970	971	972	1011	0	0.1	0	0.1	38	4.0
FARM	447	446	448	466	0	0.1	0	0.1	17	4.0
NON-FARM	523	524	524	545	0	0.1	0	0.1	20	4.0
MENIFEE COUNTY										
TOTAL	1451	1469	1480	1530	17	1.2	11	0.8	49	3.4
URBAN	480	497	508	519	16	3.5	10	2.2	10	2.2
RURAL	970	971	972	1011	0	0.1	0	0.1	38	4.0
FARM	447	446	448	466	0	0.1	0	0.1	17	4.0
NON-FARM	523	524	524	545	0	0.1	0	0.1	20	4.0

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 38										
TOTAL	1030	1024	1020	1007	-6	-0.6	-3	-0.3	-13	-1.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1030	1024	1020	1007	-6	-0.6	-3	-0.3	-13	-1.4
FARM	506	505	503	496	-3	-0.6	-1	-0.3	-7	-1.5
NON-FARM	522	519	517	511	-2	-0.6	-1	-0.3	-6	-1.3
MENIFEE COUNTY										
TOTAL	303	303	303	304	0	0.1	0	0.1	0	0.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	303	303	303	304	0	0.1	0	0.1	0	0.2
FARM	140	140	140	140	0	0.1	0	0.1	0	0.2
NON-FARM	163	163	163	164	0	0.1	0	0.1	0	0.2
MORGAN COUNTY										
TOTAL	651	644	641	626	-6	-1.0	-3	-0.5	-15	-2.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	651	644	641	626	-6	-1.0	-3	-0.5	-15	-2.4
FARM	337	334	332	324	-3	-1.0	-1	-0.5	-7	-2.4
NON-FARM	314	311	309	302	-2	-1.0	-1	-0.5	-7	-2.4
WOLFE COUNTY										
TOTAL	76	76	76	77	0	0.0	0	0.0	0	1.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	76	76	76	77	0	0.0	0	0.0	0	1.3
FARM	31	31	31	32	0	0.0	0	0.0	0	1.3
NON-FARM	45	45	45	46	0	0.0	0	0.0	0	1.3

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 39										
TOTAL	1606	1590	1581	1542	-15	-1.0	-8	-0.6	-39	-2.5
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1606	1590	1581	1542	-15	-1.0	-8	-0.6	-39	-2.5
FARM	832	824	819	799	-8	-1.0	-4	-0.6	-20	-2.5
NON-FARM	774	766	762	743	-7	-1.0	-4	-0.6	-18	-2.5
MORGAN COUNTY										
TOTAL	1606	1590	1581	1542	-15	-1.0	-8	-0.6	-39	-2.5
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1606	1590	1581	1542	-15	-1.0	-8	-0.6	-39	-2.5
FARM	832	824	819	799	-8	-1.0	-4	-0.6	-20	-2.5
NON-FARM	774	766	762	743	-7	-1.0	-4	-0.6	-18	-2.5

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 40										
TOTAL	6957	7466	7980	9487	509	7.3	514	6.9	1507	18.9
URBAN	1270	1357	1445	1690	87	6.9	87	6.4	245	17.0
RURAL	5687	6109	6535	7797	421	7.4	426	7.0	1261	19.3
FARM	2133	2291	2451	2924	158	7.4	160	7.0	473	19.3
NON-FARM	3554	3818	4085	4873	263	7.4	266	7.0	788	19.3
MAGOFFIN COUNTY										
TOTAL	6957	7466	7980	9487	509	7.3	514	6.9	1507	18.9
URBAN	1270	1357	1445	1690	87	6.9	87	6.4	245	17.0
RURAL	5687	6109	6535	7797	421	7.4	426	7.0	1261	19.3
FARM	2133	2291	2451	2924	158	7.4	160	7.0	473	19.3
NON-FARM	3554	3818	4085	4873	263	7.4	266	7.0	788	19.3

SEGMENT BREAKDOWN	POPULATION "AT-YEAR"				POPULATION NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL	277043	291591	309482	378485	14547	5.3	17891	6.1	69003	22.3
URBAN	159548	173408	190029	234836	13859	8.7	16620	9.6	44806	23.6
RURAL	117496	118184	119454	143650	687	0.6	1270	1.1	24196	20.3
FARM	53728	54061	54596	64349	332	0.6	535	1.0	9753	17.9
NON-FARM	63769	64124	64859	79302	354	0.6	735	1.1	14442	22.3

Appendix A-3

HOUSING DISAGGREGATION

HOUSING DISAGGREGATION

Subsequent to the decision that housing data would be germane to the 303(e) Planning activities for the Licking River Basin, effort was directed toward developing a housing data base for ADAPT. The housing data base was developed using information regarding present and expected future per capita density per housing unit and present and expected future population levels. The ratio of population to per capita density per housing unit was used to generate the housing data presented in the accompanying tables. In addition to the census data, which is discussed in detail in Appendix A-2, the other primary data source for developing housing data was the housing data developed by the University of Louisville Urban Studies Center in 1974.

The 1970 U. S. Census of Population data was used to develop the base year housing units per enumeration district and census tract data; the latter being applicable in selected portions of SMSA urbanized areas. The University of Louisville Urban Studies Center 1974 information pertaining to projections of people per housing unit for 1975 and 1980 were used in developing the requisite housing projections.

The University of Louisville Urban Studies Center 1974 data were extrapolated to provide people per housing unit value for 1975. The existing projections of people per housing unit, i.e., for projection years 1975 and 1980, and the developed projections for projection year 1995 were assumed to apply uniformly within each enumeration district; the census tracts having been replaced with new enumeration districts as discussed in Appendix A-2. The per capita housing unit density when used in conjunction with the population density assigned to each ADAPT cell resulted in the development of a housing density per ADAPT cell. The total housing units per ADAPT cell were then aggregated in different dimensions to produce the data in the accompanying tables.

EXHIBIT A-3T SEGMENT HOUSING UNIT TRENDS AND PROJECTIONS,"AT-YEAR" AND "BETWEEN YEAR CHANGE

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL										
URBAN										
RURAL										
FARM										
NON-FARM										
SEGMENT NUMBER 1										
TOTAL	14909	15454	16119	18333	545	3.7	664	4.3	2214	13.7
URBAN	14909	15454	16119	18333	545	3.7	664	4.3	2214	13.7
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL	3190	3305	3466	4032	114	3.6	161	4.9	565	16.3
URBAN	3190	3305	3466	4032	114	3.6	161	4.9	565	16.3
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	11720	12150	12653	14302	430	3.7	502	4.1	1649	13.0
URBAN	11720	12150	12653	14302	430	3.7	502	4.1	1649	13.0
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FARM	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-FARM	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 2										
TOTAL	8092	8575	9159	11374	483	6.0	583	6.8	2215	24.2
URBAN	5846	6291	6883	9010	444	7.6	592	9.4	2126	30.9
RURAL	2246	2284	2276	2365	38	1.7	-8	-0.4	89	3.9
FARM	692	700	709	780	14	2.0	9	0.5	70	10.0
NON-FARM	1554	1584	1566	1585	23	1.5	-11	-0.6	18	1.2
CAMPBELL COUNTY										
TOTAL	4717	5007	5321	6634	290	6.2	313	6.3	1312	24.7
URBAN	3737	3983	4342	5668	246	6.6	359	9.0	1325	30.5
RURAL	980	1024	979	966	44	4.6	-45	-4.5	-12	-1.3
FARM	231	242	231	228	10	4.6	-10	-4.5	-3	-1.3
NON-FARM	746	783	748	738	34	4.6	-34	-4.5	-9	-1.3
KENTON COUNTY										
TOTAL	2673	2839	3077	3809	166	6.2	237	8.4	731	23.8
URBAN	1927	2113	2330	3101	186	9.7	217	10.3	770	33.1
RURAL	746	726	747	708	-19	-2.6	20	2.8	-38	-5.2
FARM	157	152	157	149	-4	-2.6	4	2.6	-8	-5.2
NON-FARM	589	574	590	559	-15	-2.6	16	2.8	-30	-5.2
PENDLETON COUNTY										
TOTAL	703	729	761	932	25	3.7	32	4.4	170	22.4
URBAN	182	195	211	241	12	7.0	15	7.9	29	14.2
RURAL	521	534	551	691	13	2.5	16	3.1	140	25.6
FARM	304	312	322	404	7	2.5	9	3.1	82	25.6
NON-FARM	217	222	229	288	5	2.5	6	3.1	58	25.6

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 3										
TOTAL	16401	18609	21254	30293	2148	13.1	2645	14.2	9038	42.5
URBAN	14874	17039	19645	28765	2165	14.6	2605	15.3	9120	46.4
RURAL	1527	1570	1610	1528	-17	-1.1	39	2.5	-82	-5.1
FARM	345	342	351	332	-3	-0.9	8	2.5	-18	-5.2
NON-FARM	1242	1228	1259	1195	-13	-1.1	30	2.5	-63	-5.1
BOONE COUNTY										
TOTAL	1169	1510	1953	3300	321	27.0	443	29.4	1346	69.0
URBAN	1068	1384	1825	3183	316	29.6	440	31.8	1358	74.4
RURAL	121	125	129	116	4	4.1	3	2.5	-11	-8.8
FARM	37	39	40	36	1	4.1	0	2.5	-3	-8.8
NON-FARM	83	87	89	81	3	4.1	2	2.5	-7	-8.8
KENTON COUNTY										
TOTAL	15272	17099	19301	26993	1826	12.0	2201	12.9	7691	39.9
URBAN	13806	15655	17620	25563	1848	13.4	2165	13.8	7942	45.0
RURAL	1467	1445	1431	1410	-21	-1.5	36	2.5	-71	-4.8
FARM	366	363	511	290	-4	-1.5	7	2.5	-14	-4.8
NON-FARM	1159	1141	1170	1114	-17	-1.5	28	2.5	-56	-4.8

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 4										
TOTAL	808	907	1042	1473	99	12.3	134	14.9	430	41.4
URBAN	190	293	414	859	103	54.4	120	41.2	444	107.4
RURAL	618	614	628	614	-4	-0.7	14	2.3	-13	-2.2
FARM	130	129	132	129	0	-0.7	2	2.3	-2	-2.2
NON-FARM	488	485	496	485	-3	-0.7	11	2.3	-10	-2.2
KENTON COUNTY										
TOTAL	808	907	1042	1473	99	12.3	134	14.9	430	41.4
URBAN	190	293	414	859	103	54.4	120	41.2	444	107.4
RURAL	618	614	628	614	-4	-0.7	14	2.3	-13	-2.2
FARM	130	129	132	129	0	-0.7	2	2.3	-2	-2.2
NON-FARM	488	485	496	485	-3	-0.7	11	2.3	-10	-2.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 5										
TOTAL	293	320	346	464	26	9.0	26	8.2	118	34.2
URBAN	109	130	160	277	20	18.8	30	23.5	117	73.2
RURAL	184	190	186	187	6	3.3	-4	-2.2	1	0.5
FARM	43	45	44	44	1	3.3	-1	-2.2	0	0.5
NON-FARM	141	145	142	143	4	3.3	-3	-2.2	0	0.5
CAMPBELL COUNTY										
TOTAL	293	320	346	464	26	9.0	26	8.2	118	34.2
URBAN	109	130	160	277	20	18.8	30	23.5	117	73.2
RURAL	184	190	186	187	6	3.3	-4	-2.2	1	0.5
FARM	43	45	44	44	1	3.3	-1	-2.2	0	0.5
NON-FARM	141	145	142	143	4	3.3	-3	-2.2	0	0.5

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 6										
TOTAL	412	395	407	351	-17	-4.3	12	3.2	-56	-13.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	412	395	407	351	-17	-4.3	12	3.2	-56	-13.8
FARM	87	83	86	74	-3	-4.3	2	3.2	-11	-13.8
NON-FARM	326	312	322	277	-13	-4.3	10	3.2	-44	-13.8
KENTON COUNTY										
TOTAL	412	395	407	351	-17	-4.3	12	3.2	-56	-13.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	412	395	407	351	-17	-4.3	12	3.2	-56	-13.8
FARM	87	83	86	74	-3	-4.3	2	3.2	-11	-13.8
NON-FARM	326	312	322	277	-13	-4.3	10	3.2	-44	-13.8

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 7										
TOTAL	714	728	843	3183	13	2.0	114	15.7	2339	277.6
URBAN	166	231	322	603	65	39.3	90	39.3	281	87.3
RURAL	548	497	521	2580	-51	-9.3	23	4.7	2058	395.3
FARM	116	105	110	626	-10	-9.2	4	4.7	515	467.3
NON-FARM	432	392	410	1953	-40	-9.4	16	4.6	1542	375.9
BOONE COUNTY										
TOTAL	175	241	332	1457	65	37.7	91	37.9	1124	338.6
URBAN	166	231	322	603	65	39.3	90	39.3	281	87.3
RURAL	9	10	10	854	0	7.9	0	3.8	843	*****
FARM	3	3	3	264	0	7.9	0	3.8	260	*****
NON-FARM	6	7	7	590	0	7.9	0	3.8	583	*****
KENTON COUNTY										
TOTAL	539	487	511	1725	-51	-9.6	23	4.8	1214	237.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	539	487	511	1725	-51	-9.6	23	4.8	1214	237.9
FARM	113	102	107	362	-10	-9.6	4	4.8	255	237.9
NON-FARM	426	385	403	1363	-41	-9.6	18	4.8	959	237.9

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 8										
TOTAL	304	325	298	283	21	7.0	-27	-8.5	-14	-4.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	304	325	298	283	21	7.0	-27	-8.5	-14	-4.9
FARM	72	77	70	67	4	7.0	-6	-8.5	-3	-4.9
NON-FARM	232	248	227	216	16	7.0	-21	-8.5	-11	-4.9
CAMPBELL COUNTY										
TOTAL	304	325	298	283	21	7.0	-27	-8.5	-14	-4.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	304	325	298	283	21	7.0	-27	-8.5	-14	-4.9
FARM	72	77	70	67	4	7.0	-6	-8.5	-3	-4.9
NON-FARM	232	248	227	216	16	7.0	-21	-8.5	-11	-4.9

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 9										
TOTAL	2025	2086	2204	2557	61	3.0	118	5.7	352	16.0
URBAN	528	576	638	815	48	9.2	62	10.8	177	27.8
RURAL	1497	1510	1566	1742	12	0.9	56	3.7	175	11.2
FARM	867	886	918	1070	19	2.2	32	3.6	151	16.5
NON-FARM	630	624	648	672	-6	-1.0	24	3.9	23	3.6
GRANT COUNTY										
TOTAL	1244	1314	1403	1750	70	5.6	88	6.7	347	24.8
URBAN	528	576	638	815	48	9.2	62	10.8	177	27.8
RURAL	716	738	765	935	21	3.1	26	3.6	170	22.2
FARM	506	521	540	660	15	3.1	18	3.6	120	22.2
NON-FARM	211	217	225	275	6	3.1	7	3.6	50	22.2
KENTON COUNTY										
TOTAL	254	230	241	164	-23	-9.4	10	4.7	-76	-31.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	254	230	241	164	-23	-9.4	10	4.7	-76	-31.8
FARM	53	48	51	35	-5	-9.4	2	4.7	-16	-31.8
NON-FARM	201	182	190	130	-18	-9.4	8	4.7	-60	-31.8
PENDLETON COUNTY										
TOTAL	527	542	561	642	14	2.8	19	3.5	81	14.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	527	542	561	642	14	2.8	19	3.5	81	14.6
FARM	308	316	328	375	8	2.8	11	3.5	47	14.6
NON-FARM	219	225	233	267	6	2.8	7	3.5	33	14.6

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 10										
TOTAL	342	351	362	410	8	2.5	11	3.2	47	13.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	342	351	362	410	8	2.5	11	3.2	47	13.0
FARM	206	211	218	246	5	2.5	6	3.2	27	12.8
NON-FARM	137	140	145	164	3	2.6	4	3.3	19	13.3
BRACKEN COUNTY										
TOTAL	137	139	142	152	2	1.7	2	2.0	10	7.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	137	139	142	152	2	1.7	2	2.0	10	7.1
FARM	86	87	89	95	1	1.7	1	2.0	6	7.1
NON-FARM	51	52	53	57	0	1.7	1	2.0	3	7.1
PENDLETON COUNTY										
TOTAL	205	212	220	257	6	3.1	8	4.0	37	16.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	205	212	220	257	6	3.1	8	4.0	37	16.9
FARM	126	124	129	150	3	3.1	4	4.0	21	16.9
NON-FARM	85	88	92	107	2	3.1	3	4.0	15	16.9

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 11										
TOTAL	2219	2327	2467	2994	107	4.8	140	6.0	526	21.3
URBAN	844	931	1040	1261	87	10.4	106	11.7	220	21.2
RURAL	1376	1396	1427	1733	19	1.4	31	2.3	305	21.4
FARM	853	865	884	1070	12	1.4	19	2.2	185	21.0
NON-FARM	523	531	543	663	7	1.5	12	2.3	119	22.1
HARRISON COUNTY										
TOTAL	1166	1209	1270	1520	43	3.7	61	5.1	249	19.7
URBAN	113	146	189	283	33	29.3	42	29.1	94	49.9
RURAL	1053	1063	1082	1236	10	1.0	18	1.8	155	14.4
FARM	664	671	683	781	6	1.0	11	1.8	98	14.4
NON-FARM	388	392	399	457	3	1.0	7	1.8	57	14.4
PENDLETON COUNTY										
TOTAL	1054	1116	1197	1473	64	6.1	79	7.1	276	23.1
URBAN	731	785	851	978	54	7.5	66	8.5	126	14.9
RURAL	323	333	346	495	9	3.0	12	3.8	149	43.3
FARM	189	194	202	269	5	3.0	7	3.8	67	43.3
NON-FARM	134	138	144	206	4	3.0	5	3.8	62	45.3

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 12										
TOTAL	670	703	745	879	33	5.0	42	6.0	133	17.9
URBAN	125	140	159	215	14	11.9	19	13.6	55	34.9
RURAL	545	563	586	664	18	3.4	22	4.1	77	13.3
FARM	371	384	400	452	12	3.4	15	4.1	52	13.1
NON-FARM	173	179	187	212	5	3.4	7	4.1	25	13.7
GRANT COUNTY										
TOTAL	561	591	629	741	29	5.3	37	6.3	112	17.6
URBAN	125	140	159	215	14	11.9	19	13.6	55	34.9
RURAL	436	451	469	526	14	3.4	18	4.0	56	12.0
FARM	308	319	331	371	10	3.4	12	4.0	39	12.0
NON-FARM	128	133	138	155	4	3.4	5	4.0	16	12.0
PENDLETON COUNTY										
TOTAL	108	112	117	138	3	3.3	4	4.3	21	18.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	108	112	117	138	3	3.3	4	4.3	21	18.3
FARM	63	65	66	81	2	3.3	2	4.3	12	18.3
NON-FARM	45	47	49	57	1	3.3	1	4.3	8	18.3

Segment Breakdown	Housing Units "At-Year"				Housing Unit Number and Percentage "Between-Year"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	No.	%	No.	%	No.	%
Segment Number 13										
Total	255	266	280	354	10	4.2	13	5.2	74	26.5
Urban	29	33	38	53	4	14.1	5	16.0	15	39.9
Rural	227	233	242	301	6	2.9	8	3.6	59	24.4
Farm	153	158	164	204	4	3.0	5	3.7	40	24.8
Non-Farm	73	75	78	97	2	2.9	2	3.6	18	23.7
Grant County										
Total	189	196	210	273	9	4.9	11	5.9	63	30.1
Urban	29	33	38	53	4	14.1	5	16.0	15	39.9
Rural	160	165	172	220	5	3.3	6	3.9	48	28.0
Farm	113	117	121	155	3	3.3	4	3.9	33	28.0
Non-Farm	47	49	51	65	1	3.3	1	3.9	14	28.0
Harrison County										
Total	30	31	31	35	0	0.6	0	1.6	3	12.6
Urban	0	0	0	0	0	0.0	0	0.0	0	0.0
Rural	30	31	31	35	0	0.6	0	1.6	3	12.6
Farm	19	19	20	22	0	0.6	0	1.6	2	12.6
Non-Farm	11	11	11	13	0	0.6	0	1.6	1	12.6
Pendleton County										
Total	36	37	39	46	1	3.3	1	4.3	7	18.3
Urban	0	0	0	0	0	0.0	0	0.0	0	0.0
Rural	36	37	39	46	1	3.3	1	4.3	7	18.3
Farm	21	22	23	27	0	3.3	0	4.3	4	18.3
Non-Farm	15	16	16	19	0	3.3	0	4.3	2	18.3

Segment Breakdown	Housing Units "At-Year"				Housing Unit Number and Percentage "Between-Year"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	No.	%	No.	%	No.	%
Segment Number 14										
Total	2351	2563	2834	3847	211	9.0	271	10.6	1012	35.7
Urban	1876	2082	2344	2958	206	11.0	262	12.6	614	26.2
Rural	475	481	490	889	5	1.2	9	1.9	398	81.3
Farm	300	304	309	561	3	1.2	5	1.9	251	81.3
Non-Farm	175	178	181	328	2	1.2	3	1.9	147	81.3
Harrison County										
Total	2351	2563	2834	3847	211	9.0	271	10.6	1012	35.7
Urban	1876	2082	2344	2958	206	11.0	262	12.6	614	26.2
Rural	475	481	490	889	5	1.2	9	1.9	398	81.3
Farm	300	304	309	561	3	1.2	5	1.9	251	81.3
Non-Farm	175	178	181	328	2	1.2	3	1.9	147	81.3

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 15										
TOTAL	1223	1268	1332	1642	45	3.7	63	5.0	309	23.2
URBAN	552	583	622	721	31	5.6	38	6.7	99	15.9
RURAL	671	686	710	921	14	2.1	24	3.6	210	29.6
FARM	385	393	406	530	7	2.0	13	3.4	124	30.6
NON-FARM	286	293	304	391	8	2.3	11	3.9	86	28.4
BOURBON COUNTY										
TOTAL	273	282	299	360	9	3.4	16	6.0	61	20.5
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	273	282	299	360	9	3.4	16	6.0	61	20.5
FARM	134	138	146	176	4	3.4	8	6.0	29	20.5
NON-FARM	139	144	152	183	4	3.4	8	6.0	31	20.5
HARRISON COUNTY										
TOTAL	950	987	1033	1282	36	3.8	46	4.7	248	24.0
URBAN	552	583	622	721	31	5.6	38	6.7	99	15.9
RURAL	399	404	412	561	5	1.3	7	1.9	149	36.3
FARM	252	255	260	354	3	1.3	4	1.9	94	36.3
NON-FARM	147	149	152	207	1	1.3	2	1.9	55	36.3

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 16										
TOTAL	6357	6932	7668	9706	575	9.0	736	10.6	2037	26.6
URBAN	3130	3593	4176	4784	462	14.8	584	16.3	606	14.5
RURAL	3227	3339	3491	4922	112	3.5	151	4.5	1430	41.0
FARM	1745	1797	1868	2512	52	3.0	70	3.9	643	34.5
NON-FARM	1482	1542	1623	2410	60	4.1	80	5.2	787	48.5
BATH COUNTY										
TOTAL	237	269	310	379	32	13.6	40	15.1	68	22.2
URBAN	118	146	181	234	28	24.0	35	24.4	52	28.9
RURAL	119	124	129	145	4	3.5	5	4.0	16	12.9
FARM	63	65	66	77	2	3.5	2	4.0	8	12.9
NON-FARM	56	58	60	68	1	3.5	2	4.0	7	12.9
BOURBON COUNTY										
TOTAL	949	989	1053	1276	39	4.2	64	6.5	222	21.1
URBAN	350	347	369	434	17	5.3	21	6.2	65	17.6
RURAL	619	642	684	842	22	3.6	42	6.6	157	23.0
FARM	304	314	335	413	10	3.6	20	6.6	77	23.0
NON-FARM	316	327	349	429	11	3.6	21	6.6	80	23.0
CLARK COUNTY										
TOTAL	6	7	7	9	0	6.5	0	8.8	1	26.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	6	7	7	9	0	6.5	0	8.8	1	26.7
FARM	2	3	3	4	0	6.5	0	8.8	0	26.7
NON-FARM	4	4	4	5	0	6.5	0	8.8	1	26.7
HARRISON COUNTY										
TOTAL	5	5	5	6	0	1.3	0	2.0	0	9.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	5	5	5	6	0	1.3	0	2.0	0	9.9
FARM	3	3	3	4	0	1.3	0	2.0	0	9.9
NON-FARM	2	2	2	2	0	1.3	0	2.0	0	9.9
MONTGOMERY CO										
TOTAL	3115	3596	4185	5673	480	15.4	589	16.4	1488	35.6
URBAN	1992	2401	2906	3318	409	20.5	504	21.0	412	14.2
RURAL	1123	1194	1279	2355	71	6.3	84	7.1	1075	84.1
FARM	455	484	518	954	28	6.3	34	7.1	435	84.1
NON-FARM	668	711	761	1401	42	6.3	50	7.1	639	84.1
NICHOLAS COUNTY										
TOTAL	2044	2066	2108	2363	22	1.1	41	2.0	254	12.1
URBAN	690	698	722	798	7	1.1	23	3.3	76	10.6
RURAL	1353	1368	1387	1565	14	1.1	18	1.4	178	12.9
FARM	918	927	940	1061	9	1.1	12	1.4	121	12.9
NON-FARM	436	440	446	504	4	1.1	6	1.4	57	12.9

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 17										
TOTAL	4317	4538	4833	5915	221	5.1	294	6.5	1082	22.4
URBAN	2854	3031	3252	3916	176	6.2	220	7.3	663	20.4
RURAL	1463	1507	1581	1999	44	3.1	73	4.9	418	26.5
FARM	717	739	775	980	21	3.1	35	4.9	205	26.5
NON-FARM	746	769	806	1020	22	3.1	37	4.9	213	26.5
BOURBON COUNTY										
TOTAL	4317	4538	4833	5915	221	5.1	294	6.5	1082	22.4
URBAN	2854	3031	3252	3916	176	6.2	220	7.3	663	20.4
RURAL	1463	1507	1581	1999	44	3.1	73	4.9	418	26.5
FARM	717	739	775	980	21	3.1	35	4.9	205	26.5
NON-FARM	746	769	806	1020	22	3.1	37	4.9	213	26.5

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 18										
TOTAL	920	995	1103	1490	75	8.2	107	10.8	387	35.1
URBAN	15	45	84	202	30	204.8	38	87.0	118	141.1
RURAL	905	950	1019	1288	44	5.0	68	7.2	269	26.4
FARM	386	405	434	551	18	4.9	29	7.2	117	27.0
NON-FARM	519	546	585	737	26	5.0	39	7.2	152	26.0
BOURBON COUNTY										
TOTAL	265	325	383	609	39	14.8	58	17.9	225	58.8
URBAN	15	45	84	202	30	204.8	38	87.0	118	141.1
RURAL	271	280	300	407	9	3.7	19	6.9	107	35.8
FARM	133	137	147	200	4	3.7	9	6.9	52	35.8
NON-FARM	138	143	153	208	5	3.7	9	6.9	54	35.8
CLARK COUNTY										
TOTAL	621	655	703	860	33	5.5	48	7.3	156	22.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	621	655	703	860	33	5.5	48	7.3	156	22.3
FARM	248	261	281	343	13	5.5	19	7.3	62	22.3
NON-FARM	373	394	423	517	20	5.5	28	7.3	94	22.3
MONTGOMERY CO										
TOTAL	14	15	16	21	1	8.1	1	8.9	4	30.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	14	15	16	21	1	8.1	1	8.9	4	30.9
FARM	5	6	6	8	0	8.1	0	8.9	1	30.9
NON-FARM	8	9	9	12	0	8.1	0	8.9	2	30.9

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 19										
TOTAL	204	225	253	347	20	10.3	27	12.2	94	37.3
URBAN	170	190	215	291	19	11.6	25	13.3	76	35.4
RURAL	34	35	37	56	1	3.5	2	6.3	18	48.6
FARM	17	17	18	27	0	3.5	1	6.3	8	48.6
NON-FARM	17	18	19	28	0	3.5	1	6.3	9	48.6
BOURBON COUNTY										
TOTAL	204	225	253	347	20	10.3	27	12.2	94	37.3
URBAN	170	190	215	291	19	11.6	25	13.3	76	35.4
RURAL	34	35	37	56	1	3.5	2	6.3	18	48.6
FARM	17	17	18	27	0	3.5	1	6.3	8	48.6
NON-FARM	17	18	19	28	0	3.5	1	6.3	9	48.6

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 20										
TOTAL	4379	4869	5508	7775	490	11.2	639	13.1	2266	41.1
URBAN	3422	3868	4441	5296	445	13.0	572	14.8	854	19.3
RURAL	957	1001	1066	2479	44	4.6	66	6.6	1411	132.2
FARM	409	428	456	1025	18	4.6	28	6.6	568	124.8
NON-FARM	548	573	612	1454	25	4.7	38	6.7	842	137.7
BOURBON COUNTY										
TOTAL	302	312	330	395	10	3.3	17	5.8	64	19.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	302	312	330	395	10	3.3	17	5.8	64	19.7
FARM	146	153	162	193	4	3.3	8	5.8	31	19.7
NON-FARM	154	159	168	201	5	3.3	9	5.8	33	19.7
CLARK COUNTY										
TOTAL	4077	4556	5179	7380	480	11.8	621	13.6	2201	42.5
URBAN	3422	3868	4441	5296	445	13.0	572	14.8	854	19.3
RURAL	655	690	738	2084	34	5.3	48	7.0	1346	182.4
FARM	261	275	294	832	13	5.3	19	7.0	537	182.4
NON-FARM	394	414	444	1253	20	5.3	29	7.0	809	182.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 21										
TOTAL	592	623	662	767	30	5.2	39	6.3	105	15.9
URBAN	245	268	295	345	22	9.1	27	10.2	49	16.9
RURAL	347	355	367	422	8	2.4	11	3.3	55	15.1
FARM	208	213	220	253	4	2.4	6	3.2	32	15.0
NON-FARM	139	142	147	169	3	2.5	4	3.3	22	15.3
BRACKEN COUNTY										
TOTAL	9	9	10	10	0	1.8	0	2.2	0	7.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	9	9	10	10	0	1.8	0	2.2	0	7.7
FARM	6	6	6	6	0	1.8	0	2.2	0	7.7
NON-FARM	3	4	4	4	0	1.8	0	2.2	0	7.7
HARRISON COUNTY										
TOTAL	113	114	116	129	1	0.9	2	1.8	13	11.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	113	114	116	129	1	0.9	2	1.8	13	11.3
FARM	71	72	73	82	0	0.9	1	1.8	8	11.3
NON-FARM	42	42	43	48	0	0.9	0	1.8	4	11.3
PENDLETON COUNTY										
TOTAL	470	499	536	626	29	6.3	36	7.4	91	17.1
URBAN	245	268	295	345	22	9.1	27	10.2	49	16.9
RURAL	224	232	241	282	7	3.2	9	4.1	41	17.2
FARM	131	135	141	165	4	3.2	5	4.1	24	17.2
NON-FARM	93	96	100	118	2	3.2	3	4.1	17	17.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 22										
TOTAL	114	117	122	142	3	3.1	4	3.9	19	16.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	114	117	122	142	3	3.1	4	3.9	19	16.3
FARM	67	69	71	83	2	3.1	2	3.9	11	16.3
NON-FARM	47	49	51	59	1	3.1	1	3.9	8	16.3
PENDLETON COUNTY										
TOTAL	114	117	122	142	3	3.1	4	3.9	19	16.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	114	117	122	142	3	3.1	4	3.9	19	16.3
FARM	67	69	71	83	2	3.1	2	3.9	11	16.3
NON-FARM	47	49	51	59	1	3.1	1	3.9	8	16.3

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 23										
TOTAL	1839	1858	1883	1998	19	1.0	24	1.3	114	6.1
URBAN	288	298	314	339	10	3.6	16	5.4	24	7.8
RURAL	1551	1560	1569	1659	8	0.6	8	0.6	90	5.7
FARM	833	839	845	903	5	0.7	5	0.7	58	6.9
NON-FARM	719	721	724	756	2	0.4	2	0.4	32	4.4
BRACKEN COUNTY										
TOTAL	761	781	809	917	20	2.7	28	3.6	107	13.3
URBAN	188	199	215	239	10	5.7	15	8.0	24	11.2
RURAL	572	582	594	677	9	1.7	12	2.1	83	14.0
FARM	350	364	372	424	6	1.7	7	2.1	52	14.0
NON-FARM	214	218	222	253	3	1.7	4	2.1	31	14.0
MASON COUNTY										
TOTAL	866	866	863	858	-2	-0.3	-2	-0.3	-5	-0.7
URBAN	99	99	99	100	0	-0.3	0	0.0	0	0.5
RURAL	769	767	764	758	-2	-0.3	-2	-0.3	-6	-0.8
FARM	336	335	334	331	0	-0.3	-1	-0.3	-2	-0.8
NON-FARM	433	432	430	427	-1	-0.3	-1	-0.3	-3	-0.8
ROBERTSON CO										
TOTAL	210	211	210	224	0	0.4	0	-0.5	13	6.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	210	211	210	224	0	0.4	0	-0.5	13	6.2
FARM	139	139	139	147	0	0.4	0	-0.5	8	6.2
NON-FARM	72	72	72	76	0	0.4	0	-0.5	4	6.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 24										
TOTAL	93	92	92	89	0	-0.8	0	-1.0	-2	-3.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	93	92	92	89	0	-0.8	0	-1.0	-2	-3.2
FARM	41	40	40	39	0	-0.8	0	-1.0	-1	-3.2
NON-FARM	53	52	52	50	0	-0.8	0	-1.0	-1	-3.2
MASON COUNTY										
TOTAL	93	92	92	89	0	-0.8	0	-1.0	-2	-3.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	93	92	92	89	0	-0.8	0	-1.0	-2	-3.2
FARM	41	40	40	39	0	-0.8	0	-1.0	-1	-3.2
NON-FARM	53	52	52	50	0	-0.8	0	-1.0	-1	-3.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 25										
TOTAL	214	215	216	220	0	0.4	0	0.5	4	2.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	214	215	216	220	0	0.4	0	0.5	4	2.1
FARM	104	105	105	108	0	0.6	0	0.7	3	2.9
NON-FARM	110	110	110	112	0	0.2	0	0.3	1	1.4
FLEMING COUNTY										
TOTAL	66	67	69	75	1	2.2	1	2.5	6	9.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	66	67	69	75	1	2.2	1	2.5	6	9.6
FARM	39	40	41	45	0	2.2	1	2.5	3	9.6
NON-FARM	26	27	28	30	0	2.2	0	2.5	2	9.6
MASON COUNTY										
TOTAL	148	148	147	145	0	-0.4	0	-0.5	-2	-1.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	148	148	147	145	0	-0.4	0	-0.5	-2	-1.4
FARM	65	64	64	63	0	-0.4	0	-0.5	0	-1.4
NON-FARM	83	83	83	82	0	-0.4	0	-0.5	-1	-1.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 26										
TOTAL	970	987	1007	1074	16	1.7	19	2.0	67	6.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	970	987	1007	1074	16	1.7	19	2.0	67	6.7
FARM	556	568	582	628	11	2.1	14	2.5	46	7.9
NON-FARM	414	419	425	447	4	1.2	5	1.4	21	5.1
FLEMING COUNTY										
TOTAL	214	219	225	246	4	2.2	5	2.6	21	9.6
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	214	219	225	246	4	2.2	5	2.6	21	9.6
FARM	128	131	134	147	2	2.2	3	2.6	12	9.6
NON-FARM	86	88	91	99	1	2.2	2	2.6	8	9.6
LEWIS COUNTY										
TOTAL	260	269	281	315	9	3.6	11	4.3	34	12.3
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	260	269	281	315	9	3.6	11	4.3	34	12.3
FARM	211	219	229	257	7	3.6	9	4.3	28	12.3
NON-FARM	48	50	52	59	1	3.6	2	4.3	6	12.3
MASON COUNTY										
TOTAL	496	498	501	513	2	0.5	2	0.5	11	2.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	496	498	501	513	2	0.5	2	0.5	11	2.4
FARM	217	218	219	224	0	0.5	1	0.5	5	2.4
NON-FARM	279	281	282	289	1	0.5	1	0.5	6	2.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 27										
TOTAL	158	160	162	170	1	1.1	2	1.3	8	5.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	158	160	162	170	1	1.1	2	1.3	8	5.2
FARM	69	70	71	74	0	1.1	0	1.3	3	5.2
NON-FARM	89	90	91	96	1	1.1	1	1.3	4	5.2
MASON COUNTY										
TOTAL	158	160	162	170	1	1.1	2	1.3	8	5.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	158	160	162	170	1	1.1	2	1.3	8	5.2
FARM	69	70	71	74	0	1.1	0	1.3	3	5.2
NON-FARM	89	90	91	96	1	1.1	1	1.3	4	5.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 28										
TOTAL	3730	3769	3812	4309	38	1.0	43	1.2	497	13.0
URBAN	210	198	183	221	-12	-5.9	-14	-7.4	37	20.3
RURAL	3520	3570	3629	4089	50	1.4	58	1.6	459	12.7
FARM	2106	2139	2174	2441	30	1.4	35	1.7	266	12.3
NON-FARM	1411	1432	1455	1648	20	1.4	23	1.6	193	13.3
BATH COUNTY										
TOTAL	451	466	484	761	15	3.4	18	4.0	276	57.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	451	466	484	761	15	3.4	18	4.0	276	57.1
FARM	239	247	257	403	8	3.4	9	4.0	146	57.1
NON-FARM	212	219	226	358	7	3.4	8	4.0	130	57.1
BRACKEN COUNTY										
TOTAL	10	11	11	12	0	1.8	0	2.2	0	7.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	10	11	11	12	0	1.8	0	2.2	0	7.7
FARM	7	7	7	7	0	1.8	0	2.2	0	7.7
NON-FARM	4	4	4	4	0	1.8	0	2.2	0	7.7
FLEMING COUNTY										
TOTAL	896	915	937	1030	18	2.1	22	2.5	92	9.9
URBAN	6	5	4	7	0	-16.5	-1	-23.0	3	95.6
RURAL	890	910	934	1023	19	2.2	23	2.6	89	9.6
FARM	531	543	557	611	11	2.2	14	2.6	53	9.6
NON-FARM	359	367	376	412	8	2.2	9	2.6	36	9.6
HARRISON COUNTY										
TOTAL	448	452	460	512	4	0.9	8	1.8	51	11.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	448	452	460	512	4	0.9	8	1.8	51	11.2
FARM	283	285	290	323	2	0.9	5	1.8	32	11.2
NON-FARM	165	167	170	189	1	0.9	2	1.8	19	11.2
MASON COUNTY										
TOTAL	196	195	194	190	-1	-0.5	-1	-0.6	-3	-1.8
URBAN	16	16	16	16	0	-0.1	0	0.2	0	1.1
RURAL	180	179	178	174	-1	-0.6	-1	-0.7	-3	-2.1
FARM	79	78	78	76	0	-0.6	0	-0.7	-1	-2.1
NON-FARM	102	101	100	98	0	-0.6	0	-0.7	-2	-2.1
NICHOLAS COUNTY										
TOTAL	924	934	947	1005	9	1.1	12	1.4	58	6.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	924	934	947	1005	9	1.1	12	1.4	58	6.2
FARM	626	633	642	682	6	1.1	8	1.4	39	6.2
NON-FARM	297	301	305	324	3	1.1	4	1.4	18	6.2
ROBERTSON CO										
TOTAL	620	610	594	627	-9	-1.6	-15	-2.6	33	5.6
URBAN	189	178	164	198	-11	-6.0	-13	-7.7	33	20.5
RURAL	431	432	430	430	1	0.4	-2	-0.5	0	-0.0
FARM	264	265	263	263	1	0.4	-1	-0.5	0	-0.0
NON-FARM	147	147	147	147	0	0.4	0	-0.5	0	-0.0
ROWAN COUNTY										
TOTAL	186	187	185	172	0	0.3	-1	-0.7	-13	-7.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	186	187	185	172	0	0.3	-1	-0.7	-13	-7.4
FARM	60	60	60	55	0	0.3	0	-0.7	-4	-7.4
NON-FARM	126	126	126	116	0	0.3	0	-0.7	-9	-7.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 29										
TOTAL	1890	1928	1972	2195	37	2.0	44	2.3	222	11.3
URBAN	983	1000	1021	1135	17	1.8	20	2.1	114	11.2
RURAL	908	928	951	1060	19	2.2	23	2.6	108	11.4
FARM	543	555	569	634	11	2.2	14	2.6	64	11.4
NON-FARM	365	373	383	426	8	2.2	9	2.6	43	11.4
FLEMING COUNTY										
TOTAL	1882	1919	1964	2186	37	2.0	44	2.3	221	11.3
URBAN	983	1000	1021	1135	17	1.8	20	2.1	114	11.2
RURAL	899	919	943	1051	19	2.2	23	2.6	107	11.4
FARM	537	549	563	627	11	2.2	14	2.6	64	11.4
NON-FARM	362	370	380	423	8	2.2	9	2.6	43	11.4
NICHOLAS COUNTY										
TOTAL	9	9	9	9	0	1.1	0	1.4	0	6.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	9	9	9	9	0	1.1	0	1.4	0	6.8
FARM	6	6	6	6	0	1.1	0	1.4	0	6.8
NON-FARM	3	3	3	3	0	1.1	0	1.4	0	6.8

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 30										
TOTAL	256	261	268	294	5	2.2	6	2.5	25	9.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	256	261	268	294	5	2.2	6	2.5	25	9.7
FARM	153	156	160	175	3	2.2	3	2.5	15	9.7
NON-FARM	103	105	108	118	2	2.2	2	2.5	10	9.7
FLEMING COUNTY										
TOTAL	256	261	268	294	5	2.2	6	2.5	25	9.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	256	261	268	294	5	2.2	6	2.5	25	9.7
FARM	153	156	160	175	3	2.2	3	2.5	15	9.7
NON-FARM	103	105	108	118	2	2.2	2	2.5	10	9.7

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 31										
TOTAL	767	783	802	880	16	2.1	19	2.5	77	9.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	767	783	802	880	16	2.1	19	2.5	77	9.7
FARM	458	467	479	525	9	2.1	11	2.5	46	9.7
NON-FARM	309	316	323	355	6	2.1	7	2.5	31	9.7
FLEMING COUNTY										
TOTAL	767	783	802	880	16	2.1	19	2.5	77	9.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	767	783	802	880	16	2.1	19	2.5	77	9.7
FARM	458	467	479	525	9	2.1	11	2.5	46	9.7
NON-FARM	309	316	323	355	6	2.1	7	2.5	31	9.7

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 32										
TOTAL	3203	3396	3631	5216	193	6.1	234	6.9	1584	43.6
URBAN	546	603	675	799	57	10.5	71	11.9	124	18.4
RURAL	2656	2793	2956	4417	136	5.1	163	5.9	1460	49.4
FARM	1215	1275	1347	1984	60	4.9	71	5.6	636	45.8
NON-FARM	1441	1518	1609	2453	76	5.3	91	6.0	843	52.4
BATH COUNTY										
TOTAL	1525	1615	1727	2033	90	5.9	111	6.9	306	17.8
URBAN	546	603	675	799	57	10.5	71	11.9	124	18.4
RURAL	978	1012	1052	1234	33	3.4	40	4.0	182	17.3
FARM	519	536	557	654	17	3.4	21	4.0	96	17.3
NON-FARM	460	475	494	580	15	3.4	18	4.0	85	17.3
MENIFEE COUNTY										
TOTAL	302	313	325	367	10	3.4	12	3.9	42	13.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	302	313	325	367	10	3.4	12	3.9	42	13.0
FARM	139	144	150	169	4	3.4	5	3.9	19	13.0
NON-FARM	163	169	175	198	5	3.4	6	3.9	22	13.0
MONTGOMERY CO										
TOTAL	1376	1469	1580	2815	93	6.8	110	7.6	1235	78.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1376	1469	1580	2815	93	6.8	110	7.6	1235	78.2
FARM	557	595	640	1140	37	6.8	44	7.6	500	78.2
NON-FARM	818	874	940	1675	55	6.8	65	7.6	735	78.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 33										
TOTAL	450	467	487	555	16	3.7	20	4.3	67	13.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	450	467	487	555	16	3.7	20	4.3	67	13.9
FARM	233	241	251	286	8	3.7	10	4.3	34	13.7
NON-FARM	216	226	236	269	8	3.6	9	4.4	33	14.2
BATH COUNTY										
TOTAL	402	416	433	488	13	3.4	16	4.0	55	12.8
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	402	416	433	488	13	3.4	16	4.0	55	12.8
FARM	213	220	229	259	7	3.4	8	4.0	29	12.8
NON-FARM	189	196	203	229	6	3.4	7	4.0	25	12.8
MONTGOMERY CO										
TOTAL	46	51	54	67	2	6.0	3	6.7	12	23.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	48	51	54	67	2	6.0	3	6.7	12	23.1
FARM	20	21	22	27	1	6.0	1	6.7	5	23.1
NON-FARM	29	30	32	40	1	6.0	2	6.7	7	23.1

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 34										
TOTAL	551	591	640	787	39	7.2	49	8.3	147	23.0
URBAN	7	28	56	91	21	304.6	27	95.8	34	62.8
RURAL	544	563	585	697	18	3.4	21	3.9	112	19.2
FARM	282	292	303	362	9	3.4	11	3.9	58	19.3
NON-FARM	262	271	281	335	8	3.4	10	3.9	53	19.1
BATH COUNTY										
TOTAL	464	500	546	680	36	7.9	45	9.1	134	24.7
URBAN	7	28	56	91	21	304.6	27	95.8	34	62.8
RURAL	457	472	490	590	15	3.3	18	3.9	99	20.4
FARM	242	250	260	313	8	3.3	9	3.9	52	20.4
NON-FARM	215	222	230	277	7	3.3	8	3.9	46	20.4
MENIFEE COUNTY										
TOTAL	88	91	95	107	3	3.5	3	4.0	12	13.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	88	91	95	107	3	3.5	3	4.0	12	13.2
FARM	41	42	44	49	1	3.5	1	4.0	5	13.2
NON-FARM	47	49	51	58	1	3.5	1	4.0	6	13.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 35										
TOTAL	3533	3848	4150	5196	314	8.9	302	7.9	1046	25.2
URBAN	1275	1581	1897	2048	305	24.0	316	20.0	150	7.9
RURAL	2258	2267	2253	3149	9	0.4	-14	-0.6	895	39.8
FARM	729	732	726	1017	3	0.4	-4	-0.6	289	39.8
NON-FARM	1529	1535	1525	2132	6	0.4	-9	-0.6	606	39.8
ROWAN COUNTY										
TOTAL	3533	3848	4150	5196	314	8.9	302	7.9	1046	25.2
URBAN	1275	1581	1897	2048	305	24.0	316	20.0	150	7.9
RURAL	2258	2267	2253	3149	9	0.4	-14	-0.6	895	39.8
FARM	729	732	726	1017	3	0.4	-4	-0.6	289	39.8
NON-FARM	1529	1535	1525	2132	6	0.4	-9	-0.6	606	39.8

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 36										
TOTAL	4059	4232	4452	5211	172	4.3	219	5.2	759	17.1
URBAN	505	498	507	537	-6	-1.4	8	1.8	30	6.0
RURAL	3554	3734	3945	4674	179	5.1	211	5.7	729	18.5
FARM	1604	1682	1777	2103	78	4.9	94	5.6	325	18.3
NON-FARM	1950	2051	2168	2571	101	5.2	116	5.7	403	18.6
BATH COUNTY										
TOTAL	139	144	150	184	5	3.7	6	4.3	33	22.5
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	139	144	150	184	5	3.7	6	4.3	33	22.5
FARM	74	76	80	98	2	3.7	3	4.3	17	22.5
NON-FARM	65	68	71	87	2	3.7	2	4.3	15	22.5
ELLIOTT COUNTY										
TOTAL	121	126	134	162	5	4.8	7	5.9	27	20.7
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	121	126	134	162	5	4.8	7	5.9	27	20.7
FARM	66	70	74	89	3	4.8	4	5.9	15	20.7
NON-FARM	54	57	60	73	2	4.8	3	5.9	12	20.7
MAGOFFIN COUNTY										
TOTAL	699	788	891	1277	88	12.7	102	13.0	386	43.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	699	788	891	1277	88	12.7	102	13.0	386	43.4
FARM	262	295	334	479	33	12.7	38	13.0	144	43.4
NON-FARM	437	492	557	798	55	12.7	64	13.0	241	43.4
MENIFEE COUNTY										
TOTAL	163	168	175	198	5	3.5	6	4.0	23	13.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	163	168	175	198	5	3.5	6	4.0	23	13.2
FARM	75	78	81	91	2	3.5	3	4.0	10	13.2
NON-FARM	88	91	94	107	3	3.5	3	4.0	12	13.2
MORGAN COUNTY										
TOTAL	2253	2312	2409	2715	58	2.6	97	4.2	305	12.7
URBAN	505	498	507	537	-6	-1.4	8	1.6	30	6.0
RURAL	1748	1814	1902	2177	65	3.8	88	4.9	275	14.5
FARM	905	939	985	1128	33	3.8	45	4.9	142	14.5
NON-FARM	842	874	917	1049	31	3.8	42	4.9	132	14.5
ROWAN COUNTY										
TOTAL	684	693	693	676	9	1.3	0	-0.0	-16	-2.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	684	693	693	676	9	1.3	0	-0.0	-16	-2.4
FARM	221	224	224	218	2	1.3	0	-0.0	-5	-2.4
NON-FARM	463	469	469	458	6	1.3	0	-0.0	-11	-2.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 37										
TOTAL	490	513	537	627	22	4.7	24	4.8	89	16.6
URBAN	172	184	196	226	11	6.9	11	6.1	29	15.2
RURAL	318	329	342	401	10	3.5	13	4.0	59	17.4
FARM	146	151	157	185	5	3.5	6	4.0	27	17.4
NON-FARM	171	177	184	216	5	3.5	7	4.0	32	17.4
MENIFEE COUNTY										
TOTAL	490	513	537	627	22	4.7	24	4.8	89	16.6
URBAN	172	184	196	226	11	6.9	11	6.1	29	15.2
RURAL	318	329	342	401	10	3.5	13	4.0	59	17.4
FARM	146	151	157	185	5	3.5	6	4.0	27	17.4
NON-FARM	171	177	184	216	5	3.5	7	4.0	32	17.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 38										
TOTAL	345	359	376	430	13	3.8	17	4.8	53	14.4
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	345	359	376	430	13	3.8	17	4.8	53	14.4
FARM	171	177	186	212	6	3.8	8	4.8	26	14.3
NON-FARM	175	181	190	217	6	3.8	8	4.8	27	14.4
MENIFEE COUNTY										
TOTAL	96	101	105	119	3	3.4	3	4.0	13	13.1
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	96	101	105	119	3	3.4	3	4.0	13	13.1
FARM	45	47	48	55	1	3.4	1	4.0	6	13.1
NON-FARM	53	54	57	64	1	3.4	2	4.0	7	13.1
MORGAN COUNTY										
TOTAL	225	233	244	279	8	3.7	11	4.8	34	14.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	225	233	244	279	8	3.7	11	4.8	34	14.2
FARM	116	121	127	145	4	3.7	5	4.8	17	14.2
NON-FARM	108	112	118	135	3	3.7	5	4.8	16	14.2
WOLFE COUNTY										
TOTAL	23	25	26	32	1	6.8	1	7.9	5	20.9
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	23	25	26	32	1	6.8	1	7.9	5	20.9
FARM	9	10	11	13	0	6.8	0	7.9	2	20.9
NON-FARM	14	14	15	19	0	6.8	1	7.9	3	20.9

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 39										
TOTAL	499	517	542	619	18	3.6	24	4.8	76	14.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	499	517	542	619	18	3.6	24	4.8	76	14.2
FARM	258	268	281	321	9	3.6	12	4.8	39	14.2
NON-FARM	240	249	261	298	8	3.6	11	4.8	37	14.2
MORGAN COUNTY										
TOTAL	499	517	542	619	18	3.6	24	4.8	76	14.2
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	499	517	542	619	18	3.6	24	4.8	76	14.2
FARM	258	268	281	321	9	3.6	12	4.8	39	14.2
NON-FARM	240	249	261	298	8	3.6	11	4.8	37	14.2

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 40										
TOTAL	2099	2358	2658	3789	259	12.3	300	12.7	1130	42.5
URBAN	443	494	553	770	50	11.5	58	11.9	216	39.2
RURAL	1655	1864	2105	3019	208	12.6	241	12.9	913	43.4
FARM	621	699	789	1132	78	12.6	90	12.9	342	43.4
NON-FARM	1035	1165	1316	1887	130	12.6	150	12.9	571	43.4
MAGOFFIN COUNTY										
TOTAL	2099	2358	2658	3789	259	12.3	300	12.7	1130	42.5
URBAN	443	494	553	770	50	11.5	58	11.9	216	39.2
RURAL	1655	1864	2105	3019	208	12.6	241	12.9	913	43.4
FARM	621	699	789	1132	78	12.6	90	12.9	342	43.4
NON-FARM	1035	1165	1316	1887	130	12.6	150	12.9	571	43.4

SEGMENT BREAKDOWN	HOUSING UNITS "AT-YEAR"				HOUSING UNIT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL	93110	99512	107529	136236	6401	6.9	8017	8.1	30706	28.6
URBAN	54313	59663	66249	84887	5349	9.8	6586	11.0	18638	28.1
RURAL	38798	39850	41281	53370	1052	2.7	1431	3.6	12088	29.3
FARM	18292	18811	19487	24725	518	2.8	676	3.6	5237	26.9
NON-FARM	20505	21039	21794	28645	534	2.6	754	3.6	6851	31.4

EMPLOYMENT DISAGGREGATION

EMPLOYMENT DISAGGREGATION

The basic data for the development of the tables in this Appendix and Appendix A-5 were obtained from the Kentucky Department of Commerce. Historical information pertaining to employment is available for 1950, 1960, and 1970, however, only the 1970 data was required for inclusion in the ADAPT data base to meet the specified 303(e) planning requirements for the Licking River Basin.

Total employment data is available for each county and ADD for the eight general SIC categories and for the ten specific industries in the manufacturing category for each of the years of historic data. The 1970 data for each category, including the ten specific industrial categories, was input to the ADAPT data base at the county level by distributing the employment numbers over the urban ADAPT cells (i.e. those ADAPT cells associated with existing sewer service areas, urban land use, or urban enumeration districts) in proportion to the population in these ADAPT cells for each county in 1970. The employment mix and employment density was assumed to be homogeneous over the urban ADAPT cells within a given county.

Employment projections, available from the Department of Commerce, are at the ADD level and are available for the projection years 1980 and 1990. No employment projections are available for the ten specific industrial categories for either of the projection years.

In order to determine the expected ADD level employment levels for the years 1975 and 1995 it was assumed that the change in employment between 1970 and 1980 was linear, and that the change in employment between 1980 and 1995, through the projections for 1990, was linear.

The 1975, 1980, and 1995 industrial employment distribution for the ten specific manufacturing categories were developed on the basis of projecting trends of the ratios of total employment in each of the ten specific manufacturing categories to the total population within an ADD. Ratios for historical data were developed for 1950, 1960, and 1970 data. Arithmetic plots were used to generate estimates of the ratios for 1975, 1980, and 1995 based on the 1950, 1960, and 1970 values. In all instances the sum of the individual ratio for each of the ten specific manufacturing categories was fixed such that the product of the sum of the ratios times the total ADD population for the projection year equalled the projected total manufacturing employment at the ADD level for each projection year.

The projected employment values for each SIC category, including the ten specific manufacturing categories, were distributed over the urban ADAPT cells (as defined above) as follows:

- If the employment in the ADD at Θ_2 (time) is greater than the employment at Θ_1;
  - Subtract ADD employment at Θ_1 from ADD employment at Θ_2.
  - Distribute the difference between ADD employment at Θ_2 and ADD employment at Θ_1, (see Item 1 above) among counties according to the ratio of county urban population to ADD urban population at Θ_2.
  - Add results of Item 2 above to employment at Θ_1 in each county.
  - Distribute county level data on the basis of the ratio of the urban population in each ADAPT cell to the urban population in the county.
- If the employment at Θ_2 is less than the employment at Θ_1 in the ADD:
  - Determine the employment in each county as the ratio of employment at Θ_1 in the county to the total employment at Θ_1 in the ADD times employment at Θ_2.
  - Distribute the loss to each ADAPT cell within the county on the basis of the ratio of the total employment in the ADAPT cell at Θ_1 to the total employment in the county at Θ_1 times the county employment at Θ_2.

For those ADD's and counties which reside partially within and partially without the River Basin, the portion of the total employment in each of the categories to be distributed within the ADD/county within the River Basin was determined on the basis of in basin to total ADD/County populations.

Exhibit A-4t - Segment Employment Trends and Projections, "At Year" and "Between Year" Change

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL NON-AG.	9618	10419	11669	12332	1400	15.5	1250	12.0	663	5.7
MINING	4	5	6	12	2	131.5	2	50.2	3	47.8
CONTRACT CONST	361	363	363	333	2	0.6	0	-0.0	-29	-8.2
MANUF. TOTAL	1591	1932	2291	2315	341	21.5	356	18.0	24	1.1
FOODKIND.	106	140	111	87	-25	-15.2	-29	-21.2	-23	-21.0
TOBACCO	3	12	21	30	8	256.1	8	74.2	9	47.3
CLOTHING	95	74	55	40	-20	-21.3	-19	-26.2	-14	-26.7
LUMBER	64	106	153	193	42	66.3	47	44.7	40	26.3
PRINTING	243	284	329	379	41	17.1	44	15.8	49	15.1
CHEMICALS	60	111	166	199	50	83.6	55	49.8	33	20.1
STONE	41	57	76	90	16	40.1	19	33.2	14	18.5
PRIMARY MET.	155	163	170	190	7	5.0	7	4.5	19	11.7
MACHINERY	704	922	1146	1033	218	31.0	223	24.3	-112	-9.9
OTHER MANUF.	61	63	65	73	2	3.4	2	3.2	7	12.1
TRANSPORTATION	630	787	744	620	-43	-5.2	-42	-5.4	-124	-16.7
WHOLESALE	2361	2662	2933	2811	300	12.8	251	9.4	-122	-4.2
FINANCE	397	460	427	459	33	9.0	27	6.8	31	7.3
SERVICES	1054	2049	2388	3036	395	23.9	338	16.5	648	27.2
GOVERNMENT	1633	2201	2515	2747	368	20.1	314	14.3	232	9.2
NON-MAN. TOT	7427	8487	9376	10017	1059	14.3	891	10.5	639	6.8
SEGMENT NUMBER 1										
TOTAL NON-AG.	9618	10419	11669	12332	1400	15.5	1250	12.0	663	5.7
MINING	4	5	6	12	2	131.5	2	50.2	3	47.8
CONTRACT CONST	361	363	363	333	2	0.6	0	-0.0	-29	-8.2
MANUF. TOTAL	1591	1932	2291	2315	341	21.5	356	18.0	24	1.1
FOODKIND.	106	140	111	87	-25	-15.2	-29	-21.2	-23	-21.0
TOBACCO	3	12	21	30	8	256.1	8	74.2	9	47.3
CLOTHING	95	74	55	40	-20	-21.3	-19	-26.2	-14	-26.7
LUMBER	64	106	153	193	42	66.3	47	44.7	40	26.3
PRINTING	243	284	329	379	41	17.1	44	15.8	49	15.1
CHEMICALS	60	111	166	199	50	83.6	55	49.8	33	20.1
STONE	41	57	76	90	16	40.1	19	33.2	14	18.5
PRIMARY MET.	155	163	170	190	7	5.0	7	4.5	19	11.7
MACHINERY	704	922	1146	1033	218	31.0	223	24.3	-112	-9.9
OTHER MANUF.	61	63	65	73	2	3.4	2	3.2	7	12.1
TRANSPORTATION	630	787	744	620	-43	-5.2	-42	-5.4	-124	-16.7
WHOLESALE	2361	2662	2933	2811	300	12.8	251	9.4	-122	-4.2
FINANCE	397	460	427	459	33	9.0	27	6.8	31	7.3
SERVICES	1054	2049	2388	3036	395	23.9	338	16.5	648	27.2
GOVERNMENT	1633	2201	2515	2747	368	20.1	314	14.3	232	9.2
NON-MAN. TOT	7427	8487	9376	10017	1059	14.3	891	10.5	639	6.8

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
CAMPBELL COUNTY										
TOTAL NON-AG.	1636	2242	2613	3056	606	37.0	371	16.6	444	17.0
MINING	0	1	2	3	0	194.7	0	66.5	1	63.0
CONTRACT CONST	84	87	89	96	3	4.1	2	2.8	6	6.8
MANUF. TOTAL	596	479	508	619	-63	-21.1	68	16.4	51	9.0
FOOD&KIND.	71	61	49	42	-9	-13.6	-11	-19.5	-7	-15.0
TOBACCO	0	2	4	7	2	*****	2	100.5	2	66.3
CLOTHING	59	47	35	27	-11	-20.0	-11	-25.1	-8	-23.2
LUMBER	34	41	53	65	10	32.4	11	26.1	11	22.3
PRINTING	17	30	44	66	12	75.5	14	46.7	23	52.9
CHEMICALS	3	16	30	43	12	440.0	14	91.9	13	43.2
STONE	14	18	23	27	4	30.2	4	27.2	4	21.2
PRIMARY MET.	144	144	143	142	0	0.0	0	-0.4	-1	-1.1
MACHINERY	26	89	154	165	63	222.2	64	72.5	10	6.7
OTHER MANUF.	30	30	31	33	0	1.0	0	1.4	1	6.3
TRANSPORTATION	154	152	146	137	-2	-1.3	-5	-2.4	-10	-7.2
WHOLESALE	442	536	619	664	94	21.3	83	15.5	45	7.3
FINANCE	73	85	94	113	11	15.2	9	11.5	18	19.4
SERVICES	292	402	501	724	110	37.8	99	24.6	222	44.4
GOVERNMENT	396	500	592	700	103	26.1	92	18.4	110	18.6
NON-MAN. TOT	1442	1762	2046	2439	320	22.2	283	16.1	393	19.2
KENTON COUNTY										
TOTAL NON-AG.	7161	8177	9056	9275	996	13.9	879	10.7	218	2.4
MINING	2	4	6	9	2	116.9	1	47.4	2	43.3
CONTRACT CONST	277	276	274	243	-1	-0.4	-2	-1.0	-30	-11.1
MANUF. TOTAL	1195	1453	1726	1696	258	21.6	270	18.6	-26	-1.6
FOOD&KIND.	95	79	61	45	-15	-16.8	-17	-22.5	-15	-25.8
TOBACCO	3	10	10	25	6	200.8	6	66.1	6	42.1
CLOTHING	38	27	20	13	-8	-23.4	-7	-26.0	-6	-33.0
LUMBER	32	64	100	126	31	99.0	35	55.4	26	26.5
PRINTING	226	254	285	311	26	12.7	30	12.1	26	9.2
CHEMICALS	57	95	135	156	37	65.5	40	42.8	20	15.0
STONE	27	39	54	63	12	45.1	14	35.9	9	17.4
PRIMARY MET.	11	19	27	48	7	66.3	7	41.9	21	80.2
MACHINERY	670	632	991	808	150	23.2	158	19.1	-123	-12.4
OTHER MANUF.	31	33	34	40	1	4.3	1	4.9	5	17.4
TRANSPORTATION	675	635	596	482	-40	-6.0	-39	-6.2	-113	-19.0
WHOLESALE	1939	2146	2315	2147	206	10.7	168	7.9	-167	-7.2
FINANCE	294	316	333	346	21	7.5	17	5.5	12	3.6
SERVICES	1362	1647	1887	2312	284	20.9	239	14.6	425	22.6
GOVERNMENT	1437	1701	1923	2039	264	18.4	221	13.0	115	6.0
NON-MAN. TOT	5960	6725	7333	7576	736	12.3	608	9.0	245	3.3

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 2										
TOTAL NON-AG.	4025	4935	5874	7525	909	22.6	938	19.0	1650	28.1
MINING	34	35	36	44	1	3.4	1	3.3	7	20.9
CONTRACT CONST	170	187	198	220	10	6.0	10	5.8	22	11.3
MANUF. TOTAL	790	965	1212	1465	194	24.7	226	23.0	253	20.9
FOOD&KIND.	119	106	88	83	-12	-10.9	-17	-16.7	-4	-5.1
TOBACCO	1	5	10	18	4	548.6	4	96.8	7	81.1
CLOTHING	89	73	57	49	-15	-17.9	-16	-22.5	-7	-13.9
LUMBER	51	73	100	141	21	43.3	27	37.5	40	40.4
PRINTING	67	94	125	190	26	40.5	31	33.7	64	51.7
CHEMICALS	15	41	72	110	26	178.7	31	77.2	37	51.8
STONE	23	32	43	60	9	39.7	11	36.0	16	37.8
PRIMARY MET.	187	194	203	231	7	3.8	8	4.4	28	14.0
MACHINERY	190	322	464	523	125	64.1	142	44.2	58	12.7
OTHER MANUF.	44	47	49	61	2	5.7	2	6.3	11	22.8
TRANSPORTATION	340	342	344	350	1	0.4	2	0.6	5	1.7
WHOLESALE	1006	1216	1426	1671	210	20.9	209	17.3	244	17.2
FINANCE	157	183	209	273	26	16.6	26	14.2	64	30.7
SERVICES	650	887	1123	1702	237	36.5	235	26.5	639	56.9
GOVERNMENT	672	1100	1327	1741	227	26.1	226	20.6	414	31.2
NON-MAN. TOT	3235	3950	4662	6060	714	22.1	712	18.0	1397	30.0
CAMPBELL COUNTY										
TOTAL NON-AG.	2359	2958	3581	4688	599	25.4	622	21.0	1107	30.9
MINING	0	1	2	4	0	203.0	0	66.6	1	82.3
CONTRACT CONST	107	115	122	138	7	7.0	7	6.8	15	12.7
MANUF. TOTAL	508	633	776	946	124	24.5	144	22.9	170	21.9
FOOD&KIND.	91	81	66	64	-9	-10.6	-13	-16.4	-3	-4.9
TOBACCO	0	3	6	11	2	*****	3	108.2	5	86.1
CLOTHING	76	62	48	42	-13	-17.7	-13	-22.3	-6	-14.1
LUMBER	40	55	73	99	14	36.2	18	33.0	26	36.8
PRINTING	22	40	61	104	17	80.4	20	52.4	43	71.1
CHEMICALS	4	21	41	66	17	464.2	20	99.3	24	60.2
STONE	16	24	31	42	5	33.9	7	32.1	11	35.6
PRIMARY MET.	165	190	196	217	5	2.9	6	3.4	20	10.6
MACHINERY	36	118	211	253	82	231.3	93	79.2	41	19.4
OTHER MANUF.	30	40	42	50	1	4.7	2	5.3	7	18.9
TRANSPORTATION	190	200	203	211	1	1.0	2	1.3	7	3.8
WHOLESALE	567	707	848	1018	140	24.7	140	19.9	170	20.1
FINANCE	94	112	129	173	17	18.5	17	15.8	43	33.6
SERVICES	375	531	667	1110	156	41.7	136	29.4	423	61.6
GOVERNMENT	509	660	811	1086	151	29.7	151	23.0	274	33.8
NON-MAN. TOT	1850	2326	2803	3739	475	25.7	477	20.5	936	33.4
KENTON COUNTY										
TOTAL NON-AG.	1373	1659	1953	2399	286	20.9	293	17.7	446	22.9
MINING	0	1	1	2	0	132.3	0	56.6	0	71.9
CONTRACT CONST	53	56	59	63	3	5.7	2	5.2	3	6.6
MANUF. TOTAL	226	295	372	439	66	29.1	76	26.1	67	18.1
FOOD&KIND.	18	16	13	12	-2	-11.7	-2	-17.7	-1	-11.0
TOBACCO	1	2	3	6	1	219.2	1	78.7	2	70.4
CLOTHING	7	6	4	3	-1	-16.7	-1	-23.5	0	-19.7
LUMBER	6	13	22	33	6	111.2	8	65.1	11	54.2
PRINTING	43	52	61	81	8	19.6	9	19.1	19	31.1
CHEMICALS	11	19	29	40	8	75.5	9	51.8	11	36.0
STONE	5	8	12	16	2	53.9	3	44.4	4	40.8
PRIMARY MET.	2	4	6	12	1	78.6	1	50.8	6	116.2
MACHINERY	129	169	214	225	39	30.7	44	26.5	10	5.1
OTHER MANUF.	0	7	7	10	0	11.3	0	11.5	3	40.8
TRANSPORTATION	129	129	128	125	0	-0.2	0	-0.3	-3	-2.8
WHOLESALE	371	435	499	555	64	17.4	63	14.6	56	11.3
FINANCE	50	64	72	89	7	14.1	7	12.1	17	24.6
SERVICES	260	334	407	598	73	28.3	72	21.7	191	47.1
GOVERNMENT	275	345	415	527	70	25.7	69	20.1	112	27.2
NON-MAN. TOT	1144	1304	1581	1960	220	19.2	216	15.9	379	24.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
PENDLETON COUNTY										
TOTAL NON-AG.	294	318	340	438	23	8.0	22	7.2	97	28.5
MINING	33	33	32	37	0	-0.9	0	-0.9	4	14.3
CONTRACT CONST	16	16	16	19	0	0.9	0	0.8	2	17.5
MANUF. TOTAL	54	58	62	76	4	7.5	4	7.7	15	24.5
FOOD&KIND.	10	8	7	7	-1	-12.4	-1	-16.2	0	4.2
TOBACCO	0	0	0	1	0	0.0	0	112.0	0	105.2
CLOTHING	7	5	4	4	-1	-19.4	-1	-24.0	0	-5.8
LUMBER	5	5	6	8	0	13.9	0	14.7	2	35.0
PRINTING	2	2	3	6	0	54.7	0	39.3	2	76.7
CHEMICALS	0	1	2	3	0	0.0	0	113.6	1	82.4
STONE	0	0	1	1	0	0.0	0	117.7	0	96.9
PRIMARY MET.	0	0	0	1	0	0.0	0	108.9	0	211.9
MACHINERY	31	35	39	46	3	11.6	3	11.4	7	18.3
OTHER MANUF.	0	0	0	0	0	0.0	0	97.9	0	227.7
TRANSPORTATION	13	13	12	14	0	-1.0	0	-1.1	1	14.0
WHOLESALE	68	74	79	97	5	8.5	5	7.3	18	23.0
FINANCE	6	7	8	11	0	11.2	0	9.6	3	39.3
SERVICES	15	22	29	54	7	47.4	8	30.4	24	84.4
GOVERNMENT	89	95	101	127	6	6.9	5	6.0	26	26.5
NON-MAN. TOT	240	260	276	360	19	8.2	16	7.1	81	29.4

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 3										
TOTAL NON-AG.	11684	14406	17377	22416	2721	23.3	2971	20.6	5039	29.0
MINING	8	10	14	23	3	31.6	4	40.9	8	66.6
CONTRACT CONST	413	453	494	592	39	9.7	40	9.0	68	13.8
MANUF. TOTAL	2197	2801	3540	4269	604	27.5	739	26.4	748	21.2
FOOD&KIND.	130	120	102	98	-10	-8.1	-17	-14.5	-3	-3.9
TOBACCO	4	15	29	54	11	252.4	13	88.4	24	85.6
CLOTHING	52	44	35	30	-8	-15.6	-9	-20.7	-5	-14.4
LUMBER	171	227	303	400	56	33.1	75	33.2	97	32.2
PRINTING	387	466	566	766	80	20.9	98	21.1	202	35.7
CHEMICALS	127	197	287	399	70	55.2	90	45.8	111	38.8
STONE	66	90	123	168	24	36.5	32	36.0	45	37.2
PRIMARY MET.	15	36	47	114	14	93.2	17	59.5	66	139.7
MACHINERY	1150	1517	1947	2132	359	31.6	429	28.3	185	9.5
OTHER MANUF.	56	92	107	126	6	8.0	8	8.8	24	24.6
TRANSPORTATION	1174	1208	1240	1243	33	2.9	32	2.7	2	0.2
WHOLESALE	3137	3759	4434	5180	631	20.1	865	17.7	745	16.8
FINANCE	420	508	593	799	80	18.9	84	16.6	205	34.7
SERVICES	2021	2690	3411	5425	675	33.4	714	26.5	2013	59.0
GOVERNMENT	2360	2960	3650	4696	651	28.2	689	23.3	1246	34.1
NON-MAN. TOT	9457	11605	13837	18127	2117	22.3	2232	19.2	4290	31.0
BOONE COUNTY										
TOTAL NON-AG.	1829	2004	2225	2311	174	9.5	221	11.1	85	3.8
MINING	4	4	4	5	0	7.4	0	8.0	0	3.4
CONTRACT CONST	32	34	30	35	1	5.5	2	6.4	-1	-3.5
MANUF. TOTAL	557	598	657	611	40	7.2	59	9.9	-45	-6.9
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	1	2	4	0	0.0	1	130.5	2	100.2
CLOTHING	3	3	2	1	0	-19.4	0	-23.6	0	-32.9
LUMBER	126	130	136	122	3	2.7	5	4.4	-13	-10.0
PRINTING	77	82	89	93	4	6.4	7	8.8	4	4.6
CHEMICALS	46	53	61	61	4	16.3	7	14.0	0	0.0
STONE	29	30	33	32	1	5.0	2	6.5	-1	-3.0
PRIMARY MET.	0	1	3	9	1	0.0	1	130.1	6	247.2
MACHINERY	231	255	286	250	24	10.4	33	13.2	-36	-13.2
OTHER MANUF.	43	43	43	36	0	0.2	0	0.8	-4	-11.0
TRANSPORTATION	247	245	243	197	-2	-0.9	-1	-0.7	-46	-19.1
WHOLESALE	470	514	561	526	36	8.1	47	9.2	-35	-6.4
FINANCE	25	30	36	49	5	20.3	6	20.2	13	36.9
SERVICES	152	199	255	412	47	31.0	56	28.2	157	61.7
GOVERNMENT	337	380	432	476	43	12.9	52	13.8	43	10.1
NON-MAN. TOT	1272	1406	1569	1699	134	10.5	162	11.6	130	8.3
KENTON COUNTY										
TOTAL NON-AG.	9855	12402	15152	20106	2547	25.8	2749	22.2	4953	32.7
MINING	3	8	10	19	3	141.9	3	62.6	8	85.7
CONTRACT CONST	361	419	450	527	58	16.0	38	9.3	69	15.2
MANUF. TOTAL	1640	2233	2683	3676	563	34.4	650	30.9	794	27.5
FOOD&KIND.	130	120	102	98	-10	-8.1	-17	-14.5	-3	-3.9
TOBACCO	4	15	27	50	10	232.4	12	85.5	22	84.1
CLOTHING	49	42	33	29	-7	-15.4	-8	-20.6	-4	-13.2
LUMBER	44	97	167	270	53	119.9	69	71.4	111	66.5
PRINTING	310	386	477	675	75	24.5	91	23.7	198	41.5
CHEMICALS	79	144	227	336	65	82.7	82	57.6	111	49.0
STONE	37	60	96	136	22	60.3	29	49.9	46	52.1
PRIMARY MET.	15	29	45	104	13	86.0	16	56.5	59	133.5
MACHINERY	928	1203	1659	1862	335	36.1	390	31.4	223	13.5
OTHER MANUF.	43	50	57	87	6	15.9	7	15.7	29	52.1
TRANSPORTATION	927	963	997	1040	35	3.9	33	3.5	49	4.9
WHOLESALE	2661	3255	3873	4654	593	22.3	618	19.0	781	20.2
FINANCE	403	479	557	750	75	18.6	78	16.4	192	34.5
SERVICES	1889	2490	3150	5013	602	33.0	659	26.4	1863	58.8
GOVERNMENT	1972	2580	3218	4420	608	30.9	637	24.7	1202	37.4
NON-MAN. TOT	8215	10199	12268	16428	1983	24.1	2069	20.3	4159	33.9

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 4										
TOTAL NON-AG.	151	261	395	751	109	72.8	134	51.5	355	89.9
MINING	0	0	0	1	0	232.2	0	101.7	0	165.7
CONTRACT CONST	6	9	12	20	2	51.1	3	35.5	7	64.8
MANUF. TOTAL	25	46	75	137	21	84.6	28	62.3	62	82.5
FOOD&KIND.	2	3	3	4	0	20.3	0	6.0	1	37.6
TOBACCO	0	0	1	2	0	350.5	0	130.1	1	163.4
CLOTHING	1	1	1	1	0	16.3	0	-1.5	0	24.2
LUMBER	1	2	4	10	1	202.1	2	112.7	6	138.2
PRINTING	5	8	12	25	3	71.0	4	53.4	12	102.6
CHEMICALS	1	3	6	13	1	150.9	2	95.4	6	113.2
STONE	1	1	2	5	0	120.1	1	85.9	2	117.6
PRIMARY MET.	0	1	1	4	0	155.4	0	94.2	2	234.1
MACHINERY	14	27	43	70	12	88.9	16	63.0	26	62.4
OTHER MANUF.	1	1	1	3	0	59.1	0	43.6	1	117.7
TRANSPORTATION	14	20	26	39	6	42.7	5	26.4	13	50.2
WHOLESALE	41	68	101	174	27	66.0	32	47.6	72	72.0
FINANCE	6	10	15	28	3	63.1	4	44.4	13	92.6
SERVICES	29	53	82	187	23	83.5	29	56.8	104	127.3
GOVERNMENT	30	54	84	165	24	79.7	29	54.7	81	96.6
NON-MAN. TOT	126	214	320	613	88	70.5	105	49.2	293	91.6
KENTON COUNTY										
TOTAL NON-AG.	151	261	395	751	109	72.8	134	51.5	355	89.9
MINING	0	0	0	1	0	232.2	0	101.7	0	165.7
CONTRACT CONST	6	9	12	20	2	51.1	3	35.5	7	64.8
MANUF. TOTAL	25	46	75	137	21	84.6	28	62.3	62	82.5
FOOD&KIND.	2	3	3	4	0	20.3	0	6.0	1	37.6
TOBACCO	0	0	1	2	0	350.5	0	130.1	1	163.4
CLOTHING	1	1	1	1	0	16.3	0	-1.5	0	24.2
LUMBER	1	2	4	10	1	202.1	2	112.7	6	138.2
PRINTING	5	8	12	25	3	71.0	4	53.4	12	102.6
CHEMICALS	1	3	6	13	1	150.9	2	95.4	6	113.2
STONE	1	1	2	5	0	120.1	1	85.9	2	117.6
PRIMARY MET.	0	1	1	4	0	155.4	0	94.2	2	234.1
MACHINERY	14	27	43	70	12	88.9	16	63.0	26	62.4
OTHER MANUF.	1	1	1	3	0	59.1	0	43.6	1	117.7
TRANSPORTATION	14	20	26	39	6	42.7	5	26.4	13	50.2
WHOLESALE	41	68	101	174	27	66.0	32	47.6	72	72.0
FINANCE	6	10	15	28	3	63.1	4	44.4	13	92.6
SERVICES	29	53	82	187	23	83.5	29	56.8	104	127.3
GOVERNMENT	30	54	84	165	24	79.7	29	54.7	81	96.6
NON-MAN. TOT	126	214	320	613	88	70.5	105	49.2	293	91.6

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 5										
TOTAL NON-AG.	73	102	141	244	29	39.9	38	37.2	103	73.9
MINING	0	0	0	0	0	237.9	0	88.8	0	142.2
CONTRACT CONST	3	4	5	7	0	19.3	0	21.0	2	49.8
MANUF. TOTAL	16	22	31	49	6	36.8	8	39.3	18	62.0
FOOD&KIND.	3	3	3	3	0	-0.3	0	-5.3	0	26.3
TOBACCO	0	0	0	1	0	*****	0	136.0	0	147.2
CLOTHING	2	2	2	2	0	-6.2	0	-11.9	0	14.2
LUMBER	1	2	3	5	0	51.8	0	50.7	2	81.6
PRINTING	1	1	2	5	0	101.2	1	72.7	3	127.3
CHEMICALS	0	1	2	3	0	529.2	0	125.8	1	112.3
STONE	1	1	1	2	0	49.3	0	49.7	0	80.1
PRIMARY MET.	6	7	8	11	0	14.7	1	17.2	3	47.0
MACHINERY	1	4	6	13	2	209.4	4	103.0	4	58.7
OTHER MANUF.	1	1	2	3	0	16.7	0	19.3	0	58.0
TRANSPORTATION	6	7	8	11	0	12.6	1	14.8	3	37.9
WHOLESALE	16	24	33	53	8	39.1	8	35.9	19	59.5
FINANCE	3	4	5	9	0	32.1	1	31.2	3	77.5
SERVICES	12	18	27	58	6	56.0	8	46.6	30	114.7
GOVERNMENT	16	23	32	57	7	44.6	8	39.3	24	77.8
NON-MAN. TOT	57	81	110	195	23	40.2	29	36.0	84	77.2
CAMPBELL COUNTY										
TOTAL NON-AG.	73	102	141	244	29	39.9	38	37.2	103	73.9
MINING	0	0	0	0	0	237.9	0	88.8	0	142.2
CONTRACT CONST	3	4	5	7	0	19.3	0	21.0	2	49.8
MANUF. TOTAL	16	22	31	49	6	36.8	8	39.3	18	62.0
FOOD&KIND.	3	3	3	3	0	-0.3	0	-5.3	0	26.3
TOBACCO	0	0	0	1	0	*****	0	136.0	0	147.2
CLOTHING	2	2	2	2	0	-6.2	0	-11.9	0	14.2
LUMBER	1	2	3	5	0	51.8	0	50.7	2	81.6
PRINTING	1	1	2	5	0	101.2	1	72.7	3	127.3
CHEMICALS	0	1	2	3	0	529.2	0	125.8	1	112.3
STONE	1	1	1	2	0	49.3	0	49.7	0	80.1
PRIMARY MET.	6	7	8	11	0	14.7	1	17.2	3	47.0
MACHINERY	1	4	6	13	2	209.4	4	103.0	4	58.7
OTHER MANUF.	1	1	2	3	0	16.7	0	19.3	0	58.0
TRANSPORTATION	6	7	8	11	0	12.6	1	14.8	3	37.9
WHOLESALE	16	24	33	53	8	39.1	8	35.9	19	59.5
FINANCE	3	4	5	9	0	32.1	1	31.2	3	77.5
SERVICES	12	18	27	58	6	56.0	8	46.6	30	114.7
GOVERNMENT	16	23	32	57	7	44.6	8	39.3	24	77.8
NON-MAN. TOT	57	81	110	195	23	40.2	29	36.0	84	77.2

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 0										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&IND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&IND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 7										
TOTAL NON-AG.	369	417	481	2219	48	13.0	64	15.4	1738	361.1
MINING	1	1	1	3	0	15.6	0	14.2	2	266.3
CONTRACT CONST	8	8	9	46	0	3.6	0	6.4	37	426.7
MANUF. TOTAL	104	117	135	494	13	12.7	17	15.2	359	265.8
FOOD&KIND.	1	1	0	6	0	-26.7	0	-21.8	5	*****
TOBACCO	0	0	1	5	0	739.3	0	123.3	4	654.8
CLOTHING	1	1	1	2	0	-21.5	0	-22.3	1	328.0
LUMBER	22	24	26	73	2	9.6	2	10.0	46	179.8
PRINTING	15	16	19	82	1	10.0	2	13.6	63	336.9
CHEMICALS	9	10	12	48	1	16.3	2	20.8	35	287.5
STONE	5	6	7	23	0	12.4	0	14.5	16	245.7
PRIMARY MET.	0	0	1	10	0	253.9	0	104.5	9	*****
MACHINERY	45	52	61	224	6	15.0	9	16.5	162	206.4
OTHER MANUF.	7	8	8	23	0	5.0	0	5.3	14	174.4
TRANSPORTATION	47	48	50	151	1	2.1	1	2.9	101	203.9
WHOLESALE	97	107	122	509	10	11.2	14	13.3	387	316.7
FINANCE	7	8	9	65	0	14.3	1	19.9	56	618.9
SERVICES	37	47	61	477	10	27.9	13	29.3	415	877.4
GOVERNMENT	89	86	95	473	11	10.4	14	16.1	378	399.4
NON-MAN. TOT	265	300	346	1725	34	13.2	46	15.5	1379	496.3
BOONE COUNTY										
TOTAL NON-AG.	309	358	415	1080	49	16.1	57	16.0	665	160.1
MINING	1	1	1	2	0	13.8	0	12.8	1	158.9
CONTRACT CONST	5	6	7	16	0	11.7	0	11.1	9	141.7
MANUF. TOTAL	94	107	123	286	12	13.0	15	14.0	163	153.3
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	2	0	0.0	0	147.0	1	416.6
CLOTHING	1	0	0	1	0	-14.6	0	-26.2	0	68.1
LUMBER	21	23	25	57	1	6.6	2	9.1	31	125.6
PRINTING	13	15	17	44	1	12.7	2	13.7	26	162.0
CHEMICALS	8	10	11	29	1	16.9	1	19.1	17	152.4
STONE	5	5	6	15	0	11.9	0	13.3	8	141.6
PRIMARY MET.	0	0	0	4	0	0.0	0	146.6	3	769.8
MACHINERY	39	46	54	117	8	17.0	8	16.2	63	117.5
OTHER MANUF.	7	8	8	16	0	6.1	0	5.3	9	121.6
TRANSPORTATION	42	44	45	92	2	5.1	1	3.7	46	102.6
WHOLESALE	80	92	105	246	11	14.0	12	14.0	140	134.5
FINANCE	4	5	7	23	1	27.5	1	25.6	16	243.0
SERVICES	26	36	48	193	9	38.8	12	33.9	145	305.1
GOVERNMENT	57	68	81	223	11	19.6	12	16.8	141	175.9
NON-MAN. TOT	215	251	293	794	36	17.1	41	16.5	501	171.4
KENTON COUNTY										
TOTAL NON-AG.	60	59	66	1139	-1	-2.4	6	11.8	1073	*****
MINING	0	0	0	1	0	67.5	0	46.6	1	*****
CONTRACT CONST	2	2	2	30	0	-14.7	0	0.0	27	*****
MANUF. TOTAL	10	10	13	206	0	4.2	2	19.6	195	*****
FOOD&KIND.	1	1	0	6	0	-26.7	0	-21.8	5	*****
TOBACCO	0	0	0	3	0	157.7	0	69.8	2	*****
CLOTHING	0	0	0	2	0	-34.4	0	-27.3	1	*****
LUMBER	0	0	1	16	0	70.5	0	56.9	15	*****
PRINTING	2	2	2	38	0	-3.5	0	13.2	36	*****
CHEMICALS	0	1	1	19	0	41.7	0	44.2	18	*****
STONE	0	0	0	8	0	24.3	0	37.2	7	*****
PRIMARY MET.	0	0	0	6	0	44.2	0	45.3	5	*****
MACHINERY	6	6	7	107	0	5.5	1	20.3	99	*****
OTHER MANUF.	0	0	0	5	0	-10.2	0	5.9	4	*****
TRANSPORTATION	6	5	4	59	-1	-19.5	0	-5.2	54	*****
WHOLESALE	16	15	17	264	0	-5.2	1	6.9	246	*****
FINANCE	2	2	2	42	0	-7.9	0	6.6	40	*****
SERVICES	11	12	14	264	0	3.6	1	15.7	276	*****
GOVERNMENT	12	12	14	250	0	1.5	1	14.2	236	*****
NON-MAN. TOT	50	49	53	931	-1	-3.0	4	10.1	877	*****

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 8										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 9										
TOTAL NON-AG.	588	654	721	823	66	11.2	66	10.2	102	14.2
MINING	0	0	0	0	0	0.0	0	98.6	0	96.0
CONTRACT CONST	20	20	21	22	0	3.2	0	2.8	0	4.3
MANUF. TOTAL	57	74	93	109	16	28.5	18	25.4	16	17.9
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	1	1	1	2	0	44.1	0	30.1	0	39.3
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	2	4	6	1	0.0	1	118.9	2	76.8
PRINTING	2	4	7	11	2	88.8	2	54.2	4	71.1
CHEMICALS	53	54	56	58	1	3.2	1	3.6	1	2.9
STONE	2	3	3	4	0	35.1	0	31.4	1	32.9
PRIMARY MET.	0	0	1	2	0	0.0	0	107.7	1	185.5
MACHINERY	0	10	20	24	9	0.0	10	110.7	3	17.5
OTHER MANUF.	0	0	0	1	0	0.0	0	123.5	0	226.7
TRANSPORTATION	59	58	58	57	0	-0.6	0	-0.7	-1	-2.0
WHOLESALE	186	200	214	226	14	7.8	13	6.9	12	5.6
FINANCE	23	25	27	31	1	7.5	1	6.7	4	15.0
SERVICES	65	83	99	145	17	26.4	16	20.2	45	45.3
GOVERNMENT	176	194	209	234	15	8.9	15	7.9	24	11.8
NON-MAN. TOT	531	580	626	714	49	9.4	47	8.3	85	13.7
GRANT COUNTY										
TOTAL NON-AG.	538	654	721	823	66	11.2	66	10.2	102	14.2
MINING	0	0	0	0	0	0.0	0	98.6	0	96.0
CONTRACT CONST	20	20	21	22	0	3.2	0	2.8	0	4.3
MANUF. TOTAL	57	74	93	109	16	28.5	18	25.4	16	17.9
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	1	1	1	2	0	44.1	0	30.1	0	39.3
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	2	4	6	1	0.0	1	118.9	2	76.8
PRINTING	2	4	7	11	2	88.8	2	54.2	4	71.1
CHEMICALS	53	54	56	58	1	3.2	1	3.6	1	2.9
STONE	2	3	3	4	0	35.1	0	31.4	1	32.9
PRIMARY MET.	0	0	1	2	0	0.0	0	107.7	1	185.5
MACHINERY	0	10	20	24	9	0.0	10	110.7	3	17.5
OTHER MANUF.	0	0	0	1	0	0.0	0	123.5	0	226.7
TRANSPORTATION	59	58	58	57	0	-0.6	0	-0.7	-1	-2.0
WHOLESALE	186	200	214	226	14	7.8	13	6.9	12	5.6
FINANCE	23	25	27	31	1	7.5	1	6.7	4	15.0
SERVICES	65	83	99	145	17	26.4	16	20.2	45	45.3
GOVERNMENT	176	194	209	234	15	8.9	15	7.9	24	11.8
NON-MAN. TOT	531	580	626	714	49	9.4	47	8.3	85	13.7
KENTON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
PENDLETON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOODKIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 10										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
BRACKEN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 11										
TOTAL NON-AG.	1084	1231	1389	1655	147	13.6	158	12.8	265	19.1
MINING	107	107	107	107	0	0.2	0	0.2	0	-0.3
CONTRACT CONST	53	56	59	65	2	5.1	3	5.0	5	10.0
MANUF. TOTAL	231	268	310	300	37	16.1	42	15.9	55	17.9
FOOD&KIND.	37	34	31	29	-2	-6.7	-3	-11.4	-1	-5.9
TOBACCO	0	1	3	4	1	242.7	1	70.2	1	59.8
CLOTHING	30	30	29	33	0	-1.9	0	-1.7	3	11.3
LUMBER	15	17	20	24	2	15.3	2	16.4	3	19.7
PRINTING	6	11	16	26	5	91.3	5	51.3	10	63.3
CHEMICALS	2	6	10	15	3	175.7	4	75.9	4	49.2
STONE	0	2	4	8	1	316.0	1	108.3	4	128.7
PRIMARY MET.	7	9	12	16	2	32.0	2	26.2	4	36.6
MACHINERY	120	148	173	191	27	17.3	25	17.3	17	10.4
OTHER MANUF.	7	10	13	20	2	34.6	3	33.1	6	49.1
TRANSPORTATION	45	48	50	55	2	5.0	2	5.7	4	9.4
WHOLESALE	248	281	315	352	32	13.2	34	12.1	37	11.9
FINANCE	27	32	36	51	5	19.2	5	17.4	13	35.1
SERVICES	66	99	133	222	33	50.0	34	34.7	88	66.6
GOVERNMENT	307	341	377	430	33	11.1	35	10.4	60	16.1
NON-MAN. TOT	853	963	1079	1290	110	12.9	115	12.0	210	19.5
HARRISON COUNTY										
TOTAL NON-AG.	140	202	277	414	62	45.0	74	36.7	137	49.8
MINING	1	1	1	2	0	31.0	0	27.8	0	44.6
CONTRACT CONST	2	4	6	11	1	91.2	2	56.9	4	79.7
MANUF. TOTAL	56	80	107	146	22	39.6	26	32.5	39	36.7
FOOD&KIND.	6	7	8	8	1	20.2	0	12.2	0	4.5
TOBACCO	0	1	2	2	0	144.0	0	52.0	0	49.3
CLOTHING	9	12	16	22	3	41.2	3	36.3	5	37.0
LUMBER	0	0	0	1	0	169.9	0	114.8	0	222.3
PRINTING	1	3	5	10	2	333.5	2	77.7	4	79.2
CHEMICALS	2	3	4	6	0	47.7	1	41.5	1	37.2
STONE	0	1	2	5	0	230.5	0	95.1	3	204.7
PRIMARY MET.	7	9	11	13	1	24.9	1	21.0	2	22.1
MACHINERY	25	35	46	61	9	36.1	11	33.0	14	31.5
OTHER MANUF.	7	10	13	18	2	31.5	3	31.5	5	43.9
TRANSPORTATION	5	7	10	15	2	51.0	2	40.0	5	53.0
WHOLESALE	30	42	56	76	12	40.5	14	34.0	20	35.9
FINANCE	6	9	12	20	2	42.5	3	35.3	7	65.4
SERVICES	17	26	36	69	9	56.0	11	43.3	33	83.0
GOVERNMENT	22	33	47	70	11	53.0	14	42.0	22	80.4
NON-MAN. TOT	82	122	170	269	40	49.2	49	39.4	98	58.0
PENDLETON COUNTY										
TOTAL NON-AG.	944	1029	1113	1241	84	9.0	83	8.1	128	11.5
MINING	100	100	100	105	0	-0.0	0	0.0	0	-0.3
CONTRACT CONST	51	52	53	54	0	1.7	0	1.7	1	2.0
MANUF. TOTAL	173	187	204	220	14	8.4	16	8.7	16	8.0
FOOD&KIND.	31	27	23	20	-3	-11.7	-4	-17.4	-2	-9.0
TOBACCO	0	0	1	2	0	6.0	0	113.9	0	70.0
CLOTHING	22	18	14	11	-4	-18.7	-4	-23.3	-2	-18.2
LUMBER	15	17	19	23	2	14.8	2	15.8	3	17.1
PRINTING	5	8	11	17	2	58.0	3	40.8	5	55.1
CHEMICALS	0	3	6	9	2	6.0	3	115.8	3	58.3
STONE	0	1	2	3	0	8.0	1	119.8	1	70.8
PRIMARY MET.	0	1	1	3	0	6.0	0	110.8	1	170.7
MACHINERY	100	113	127	151	12	12.8	14	12.4	3	2.7
OTHER MANUF.	0	0	0	1	0	8.0	0	99.7	0	104.4
TRANSPORTATION	41	41	41	40	0	-0.2	0	-0.2	0	-1.1
WHOLESALE	219	239	259	277	20	9.4	19	8.3	17	6.7
FINANCE	23	23	26	31	2	12.2	2	10.6	5	20.9
SERVICES	49	72	95	152	23	46.8	22	31.0	57	60.0
GOVERNMENT	226	306	329	362	22	7.8	23	7.0	32	9.8
NON-MAN. TOT	771	841	969	1021	70	9.1	67	8.0	111	12.3

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 12										
TOTAL NON-AG.	127	145	165	187	18	14.6	19	13.7	21	13.1
MINING	0	0	0	0	0	0.0	0	105.0	0	94.1
CONTRACT CONST	4	5	5	5	0	6.3	0	6.1	0	3.3
MANUF. TOTAL	12	16	21	25	3	32.3	4	29.4	3	16.7
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	46.4	0	34.3	0	37.9
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	1	1	0	0.0	0	125.9	0	75.1
PRINTING	0	1	2	3	0	94.4	0	59.1	1	69.4
CHEMICALS	11	12	13	13	0	6.2	0	7.0	0	1.9
STONE	0	1	1	1	0	39.2	0	35.7	0	31.5
PRIMARY MET.	0	0	0	1	0	0.0	0	114.3	0	182.7
MACHINERY	0	2	5	5	2	0.0	2	117.5	0	16.3
OTHER MANUF.	0	0	0	0	0	0.0	0	130.6	0	223.4
TRANSPORTATION	13	13	13	13	0	2.3	0	2.5	0	-3.0
WHOLESALE	40	44	49	51	4	11.0	4	10.4	2	4.6
FINANCE	5	6	6	7	0	10.8	0	10.1	0	13.9
SERVICES	14	18	23	33	4	30.2	4	24.1	9	43.9
GOVERNMENT	36	43	48	53	4	12.2	4	11.3	5	10.7
NON-MAN. TOT	114	129	144	162	14	12.6	15	11.7	18	12.5
GRANT COUNTY										
TOTAL NON-AG.	127	145	165	187	18	14.6	19	13.7	21	13.1
MINING	0	0	0	0	0	0.0	0	105.0	0	94.1
CONTRACT CONST	4	5	5	5	0	6.3	0	6.1	0	3.3
MANUF. TOTAL	12	16	21	25	3	32.3	4	29.4	3	16.7
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	46.4	0	34.3	0	37.9
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	1	1	0	0.0	0	125.9	0	75.1
PRINTING	0	1	2	3	0	94.4	0	59.1	1	69.4
CHEMICALS	11	12	13	13	0	6.2	0	7.0	0	1.9
STONE	0	1	1	1	0	39.2	0	35.7	0	31.5
PRIMARY MET.	0	0	0	1	0	0.0	0	114.3	0	182.7
MACHINERY	0	2	5	5	2	0.0	2	117.5	0	16.3
OTHER MANUF.	0	0	0	0	0	0.0	0	130.6	0	223.4
TRANSPORTATION	13	13	13	13	0	2.3	0	2.5	0	-3.0
WHOLESALE	40	44	49	51	4	11.0	4	10.4	2	4.6
FINANCE	5	6	6	7	0	10.8	0	10.1	0	13.9
SERVICES	14	18	23	33	4	30.2	4	24.1	9	43.9
GOVERNMENT	36	43	48	53	4	12.2	4	11.3	5	10.7
NON-MAN. TOT	114	129	144	162	14	12.6	15	11.7	18	12.5
PENDLETON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

Segment Breakdown	Employment "At-Year"				Employment Number and Percentage "Between-Year"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	No.	%	No.	%	No.	%
SEGMENT NUMBER 13										
TOTAL NON-AG.	33	38	43	73	4	14.4	5	13.5	29	68.5
MINING	0	0	0	0	0	0.0	0	104.6	0	189.1
CONTRACT CONST	1	1	1	2	0	6.1	0	5.9	0	53.9
MANUF. TOTAL	3	4	6	10	1	32.1	1	29.2	4	73.9
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	48.1	0	34.0	0	105.4
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	1	0	0.0	0	125.5	0	160.8
PRINTING	0	0	0	1	0	94.1	0	58.8	0	152.4
CHEMICALS	3	3	3	5	0	6.1	0	6.8	1	51.8
STONE	0	0	0	0	0	38.9	0	35.4	0	96.0
PRIMARY MET.	0	0	0	0	0	0.0	0	113.9	0	321.1
MACHINERY	0	1	1	2	0	0.0	0	117.1	0	73.3
OTHER MANUF.	0	0	0	0	0	0.0	0	130.2	0	381.9
TRANSPORTATION	3	3	3	5	0	2.2	0	2.3	1	44.6
WHOLESALE	11	12	13	20	1	10.8	1	10.2	7	55.8
FINANCE	1	1	2	3	0	10.6	0	9.9	1	69.6
SERVICES	4	5	6	13	1	30.0	1	23.9	6	114.4
GOVERNMENT	10	11	13	21	1	12.0	1	11.1	8	85.0
NON-MAN. TOT	30	34	38	63	3	12.4	3	11.5	25	67.7
GRANT COUNTY										
TOTAL NON-AG.	33	38	43	73	4	14.4	5	13.5	29	68.5
MINING	0	0	0	0	0	0.0	0	104.6	0	189.1
CONTRACT CONST	1	1	1	2	0	6.1	0	5.9	0	53.9
MANUF. TOTAL	3	4	6	10	1	32.1	1	29.2	4	73.9
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	48.1	0	34.0	0	105.4
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	1	0	0.0	0	125.5	0	160.8
PRINTING	0	0	0	1	0	94.1	0	58.8	0	152.4
CHEMICALS	3	3	3	5	0	6.1	0	6.8	1	51.8
STONE	0	0	0	0	0	38.9	0	35.4	0	96.0
PRIMARY MET.	0	0	0	0	0	0.0	0	113.9	0	321.1
MACHINERY	0	1	1	2	0	0.0	0	117.1	0	73.3
OTHER MANUF.	0	0	0	0	0	0.0	0	130.2	0	381.9
TRANSPORTATION	3	3	3	5	0	2.2	0	2.3	1	44.6
WHOLESALE	11	12	13	20	1	10.8	1	10.2	7	55.8
FINANCE	1	1	2	3	0	10.6	0	9.9	1	69.6
SERVICES	4	5	6	13	1	30.0	1	23.9	6	114.4
GOVERNMENT	10	11	13	21	1	12.0	1	11.1	8	85.0
NON-MAN. TOT	30	34	38	63	3	12.4	3	11.5	25	67.7
HARRISON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
PENDLETON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 14										
TOTAL NON-AG.	2631	3309	3984	5064	678	25.8	675	20.4	1079	27.1
MINING	13	14	16	20	1	14.2	1	12.6	3	22.7
CONTRACT CONST	36	63	88	134	24	65.9	25	40.0	46	52.5
MANUF. TOTAL	1089	1314	1534	1780	224	20.6	220	16.7	245	16.0
FOOD&KIND.	110	115	113	101	4	4.3	-1	-1.2	-12	-11.3
TOBACCO	8	17	23	30	9	112.2	5	34.4	6	26.7
CLOTHING	161	197	227	264	36	22.5	29	14.8	36	16.3
LUMBER	1	2	4	10	1	151.5	1	89.2	6	173.5
PRINTING	13	50	79	120	36	276.1	28	56.5	41	52.1
CHEMICALS	39	50	63	73	11	28.1	12	24.6	10	16.4
STONE	4	13	22	57	8	186.7	9	71.8	34	158.6
PRIMARY MET.	154	145	154	160	11	8.4	9	6.6	5	3.6
MACHINERY	476	565	664	741	88	18.0	99	17.6	76	11.6
OTHER MANUF.	140	159	185	225	19	14.1	25	15.8	40	22.1
TRANSPORTATION	85	112	139	182	26	31.5	26	24.0	42	30.3
WHOLESALE	559	681	804	928	122	21.9	123	18.1	123	15.4
FINANCE	117	145	173	243	27	23.7	27	19.2	69	40.3
SERVICES	319	432	546	848	113	35.4	113	26.2	302	55.3
GOVERNMENT	410	546	684	930	136	33.2	137	25.1	246	36.1
NON-MAN. TOT	1542	1995	2450	3284	453	29.4	455	22.8	834	34.0
HARRISON COUNTY										
TOTAL NON-AG.	2631	3309	3984	5064	678	25.8	675	20.4	1079	27.1
MINING	13	14	16	20	1	14.2	1	12.6	3	22.7
CONTRACT CONST	38	63	88	134	24	65.9	25	40.0	46	52.5
MANUF. TOTAL	1089	1314	1534	1780	224	20.6	220	16.7	245	16.0
FOOD&KIND.	110	115	113	101	4	4.3	-1	-1.2	-12	-11.3
TOBACCO	8	17	23	30	9	112.2	5	34.4	6	26.7
CLOTHING	161	197	227	264	36	22.5	29	14.8	36	16.3
LUMBER	1	2	4	10	1	151.5	1	89.2	6	173.5
PRINTING	13	50	79	120	36	276.1	28	56.5	41	52.1
CHEMICALS	39	50	63	73	11	28.1	12	24.6	10	16.4
STONE	4	13	22	57	8	186.7	9	71.8	34	158.6
PRIMARY MET.	154	145	154	160	11	8.4	9	6.6	5	3.6
MACHINERY	476	565	664	741	88	18.0	99	17.6	76	11.6
OTHER MANUF.	140	159	185	225	19	14.1	25	15.8	40	22.1
TRANSPORTATION	85	112	139	182	26	31.5	26	24.0	42	30.3
WHOLESALE	559	681	804	928	122	21.9	123	18.1	123	15.4
FINANCE	117	145	173	243	27	23.7	27	19.2	69	40.3
SERVICES	319	432	546	848	113	35.4	113	26.2	302	55.3
GOVERNMENT	410	546	684	930	136	33.2	137	25.1	246	36.1
NON-MAN. TOT	1542	1995	2450	3284	453	29.4	455	22.8	834	34.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 15										
TOTAL NON-AG.	771	916	1037	1227	145	18.8	120	13.2	190	18.4
MINING	4	4	4	5	0	7.9	0	5.9	0	14.3
CONTRACT CONST	11	17	23	33	6	56.7	5	31.6	9	42.0
MANUF. TOTAL	319	364	399	431	44	14.0	35	9.8	32	8.1
FOOD&KIND.	32	32	29	24	0	-1.5	-2	-7.1	-5	-17.4
TOBACCO	2	5	6	7	2	100.5	1	26.4	1	17.9
CLOTHING	47	55	59	64	7	15.7	4	7.9	4	8.3
LUMBER	0	1	1	2	0	137.6	0	77.9	1	154.7
PRINTING	4	14	20	29	10	255.4	6	47.2	8	41.7
CHEMICALS	12	14	16	18	2	21.1	2	17.2	1	8.4
STONE	1	4	6	14	2	170.9	2	61.6	8	140.8
PRIMARY MET.	39	40	40	39	0	2.4	0	0.2	-1	-3.5
MACHINERY	140	156	173	180	16	11.5	16	10.6	6	3.9
OTHER MANUF.	41	44	48	55	3	7.8	3	8.9	6	13.7
TRANSPORTATION	25	31	36	44	6	24.2	5	16.6	7	21.4
WHOLESALE	164	188	209	225	24	15.2	20	11.0	15	7.4
FINANCE	34	40	45	59	5	16.8	4	12.1	13	30.7
SERVICES	94	120	142	205	26	27.9	22	18.7	63	44.6
GOVERNMENT	120	151	178	225	31	25.9	26	17.6	47	26.8
NON-MAN. TOT	452	552	637	796	100	22.3	85	15.5	158	24.8
BOURBON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL NON-AG.	771	916	1037	1227	145	18.8	120	13.2	190	18.4
MINING	4	4	4	5	0	7.9	0	5.9	0	14.3
CONTRACT CONST	11	17	23	33	6	56.7	5	31.6	9	42.0
MANUF. TOTAL	319	364	399	431	44	14.0	35	9.8	32	8.1
FOOD&KIND.	32	32	29	24	0	-1.5	-2	-7.1	-5	-17.4
TOBACCO	2	5	6	7	2	100.5	1	26.4	1	17.9
CLOTHING	47	55	59	64	7	15.7	4	7.9	4	8.3
LUMBER	0	1	1	2	0	137.6	0	77.9	1	154.7
PRINTING	4	14	20	29	10	255.4	6	47.2	8	41.7
CHEMICALS	12	14	16	18	2	21.1	2	17.2	1	8.4
STONE	1	4	6	14	2	170.9	2	61.6	8	140.8
PRIMARY MET.	39	40	40	39	0	2.4	0	0.2	-1	-3.5
MACHINERY	140	156	173	180	16	11.5	16	10.6	6	3.9
OTHER MANUF.	41	44	48	55	3	7.8	3	8.9	6	13.7
TRANSPORTATION	25	31	36	44	6	24.2	5	16.6	7	21.4
WHOLESALE	164	188	209	225	24	15.2	20	11.0	15	7.4
FINANCE	34	40	45	59	5	16.8	4	12.1	13	30.7
SERVICES	94	120	142	205	26	27.9	22	18.7	63	44.6
GOVERNMENT	120	151	178	225	31	25.9	26	17.6	47	26.8
NON-MAN. TOT	452	552	637	796	100	22.3	85	15.5	158	24.8

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 10										
TOTAL NON-AG.	6244	7814	9686	10893	1570	25.1	1871	24.0	1207	12.5
MINING	11	20	32	48	6	80.0	11	59.6	16	52.4
CONTRACT CONST	184	250	334	419	66	36.4	83	33.3	84	25.5
MANUF. TOTAL	3136	3843	4667	4893	706	22.5	823	21.4	226	4.8
FOOD&KIND.	40	46	46	28	1	4.0	-2	-4.4	-17	-38.7
TOBACCO	13	17	21	24	4	36.9	3	20.5	2	12.0
CLOTHING	1373	1546	1713	1799	173	12.6	167	10.8	85	5.0
LUMBER	1	13	34	59	11	*****	20	161.7	25	77.1
PRINTING	17	39	59	78	21	126.4	19	51.2	18	32.0
CHEMICALS	0	12	26	42	11	0.0	14	123.0	16	62.9
STONE	41	36	34	40	-3	-8.2	-3	-9.3	5	17.3
PRIMARY MET.	0	5	8	9	4	0.0	3	78.4	1	17.3
MACHINERY	1646	2116	2706	2763	472	28.7	590	27.9	74	2.8
OTHER MANUF.	0	8	18	31	8	0.0	9	118.0	12	71.4
TRANSPORTATION	104	140	182	212	35	34.3	41	29.8	30	16.7
WHOLESALE	1124	1313	1537	1530	189	16.8	223	17.0	-6	-0.4
FINANCE	159	192	230	283	32	20.6	38	19.8	53	23.1
SERVICES	412	543	694	952	130	31.7	151	27.8	256	37.2
GOVERNMENT	1113	1512	2011	2555	399	35.8	498	32.9	544	27.1
NON-MAN. TOT	3108	3971	5019	6060	863	27.8	1047	26.4	981	19.6
BATH COUNTY										
TOTAL NON-AG.	121	209	325	395	87	72.2	116	55.8	69	21.4
MINING	0	0	1	2	0	0.0	0	150.2	0	77.7
CONTRACT CONST	9	13	19	23	4	46.8	5	42.7	3	19.8
MANUF. TOTAL	2	37	65	115	35	*****	47	128.3	29	34.7
FOOD&KIND.	0	0	0	0	0	11.3	0	2.7	0	-38.2
TOBACCO	0	0	0	0	0	0.0	0	156.9	0	122.5
CLOTHING	0	9	19	29	9	0.0	10	110.9	10	53.5
LUMBER	1	1	3	4	0	113.7	1	97.2	1	43.9
PRINTING	1	1	2	2	0	75.3	0	66.0	0	23.9
CHEMICALS	0	0	1	2	0	0.0	0	151.6	0	69.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	25	60	77	25	0.0	35	140.3	17	28.4
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	10	13	16	16	2	24.4	3	24.1	0	0.4
WHOLESALE	23	33	46	48	10	44.7	13	41.0	1	4.0
FINANCE	4	6	8	10	1	37.9	2	36.5	2	24.7
SERVICES	6	11	19	30	5	92.5	7	66.6	10	58.7
GOVERNMENT	68	95	131	151	27	40.6	36	36.0	20	15.5
NON-MAN. TOT	120	171	240	286	51	43.3	66	40.0	39	16.6
BOURBON COUNTY										
TOTAL NON-AG.	320	410	490	561	90	28.2	79	19.5	71	14.6
MINING	1	2	2	2	0	16.5	0	12.7	0	12.9
CONTRACT CONST	17	20	23	26	3	19.7	2	14.0	2	12.6
MANUF. TOTAL	86	116	143	157	30	34.8	26	22.6	14	9.8
FOOD&KIND.	2	2	2	2	0	34.7	0	-4.1	0	-20.0
TOBACCO	2	3	4	4	1	58.8	0	20.3	0	6.8
CLOTHING	60	64	66	64	3	6.6	2	3.7	-2	-3.5
LUMBER	1	1	1	1	0	30.0	0	32.0	0	86.9
PRINTING	2	7	11	14	5	262.8	3	49.7	3	31.2
CHEMICALS	0	2	3	4	1	0.0	1	101.7	0	24.8
STONE	1	2	3	6	1	236.7	1	70.4	3	121.5
PRIMARY MET.	0	2	3	3	1	0.0	1	75.3	0	11.0
MACHINERY	20	32	44	48	11	59.3	12	39.1	3	9.1
OTHER MANUF.	0	3	6	10	2	0.0	3	117.7	3	64.2
TRANSPORTATION	12	16	19	22	3	29.7	3	20.4	2	14.6
WHOLESALE	66	82	97	101	16	24.2	14	17.3	4	4.2
FINANCE	10	14	17	23	3	37.5	3	24.5	5	35.0
SERVICES	36	52	65	92	15	42.8	13	26.9	26	40.8
GOVERNMENT	91	109	124	139	17	19.5	15	14.4	14	12.1
NON-MAN. TOT	233	293	347	404	59	25.7	53	18.2	57	16.6

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
CLARK COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MONTGOMERY CO										
TOTAL NON-AG.	4472	5671	7170	7995	1199	26.8	1498	26.4	824	11.5
MINING	10	17	28	42	7	70.7	10	60.1	14	52.9
CONTRACT CONST	143	195	263	331	52	36.4	68	34.9	68	25.9
MANUF. TOTAL	2399	2977	3669	3795	577	24.1	692	23.3	125	3.4
FOOD&KIND.	44	44	42	25	0	0.1	-2	-4.6	-16	-40.2
TOBACCO	11	11	13	13	0	6.4	1	11.6	0	5.7
CLOTHING	670	819	967	1037	149	22.4	147	18.0	69	7.2
LUMBER	0	10	29	52	10	0.0	18	178.5	22	78.2
PRINTING	11	17	25	31	5	46.6	8	48.5	5	23.2
CHEMICALS	0	6	15	27	6	0.0	8	133.0	12	82.0
STONE	41	34	26	21	-6	-17.2	-7	-21.4	-5	-26.5
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	1623	2034	2551	2588	411	25.4	516	25.4	37	1.5
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	77	99	127	145	21	28.6	28	28.7	18	14.3
WHOLESALE	845	974	1137	1098	128	15.2	163	16.8	-39	-3.4
FINANCE	112	132	157	186	19	17.4	25	19.3	29	18.9
SERVICES	322	400	500	653	77	24.1	99	25.0	153	30.7
GOVERNMENT	504	879	1289	1744	374	55.6	410	46.7	454	35.2
NON-MAN. TOT	2073	2695	3501	4200	621	30.0	806	29.9	698	20.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
NICHOLAS COUNTY										
TOTAL NON-AG.	1331	1524	1701	1942	193	14.5	176	11.6	241	14.2
MINING	0	0	1	2	0	0.0	0	100.0	0	80.0
CONTRACT CONST	15	22	29	39	7	46.0	6	30.2	10	35.6
MANUF. TOTAL	649	713	770	827	63	9.8	57	8.0	56	7.4
FOOD&KIND.	0	1	1	1	1	0.0	0	0.0	0	-16.7
TOBACCO	0	3	4	6	2	0.0	1	55.6	1	33.3
CLOTHING	643	653	661	669	10	1.6	7	1.1	8	1.2
LUMBER	0	0	1	2	0	0.0	0	166.7	1	162.5
PRINTING	3	14	21	30	10	360.0	7	54.3	9	43.2
CHEMICALS	0	3	6	9	3	0.0	3	100.0	2	35.9
STONE	0	2	5	13	2	0.0	2	104.2	7	159.2
PRIMARY MET.	0	3	5	6	2	0.0	2	80.0	1	20.4
MACHINERY	3	27	53	70	24	813.3	25	94.2	16	31.2
OTHER MANUF.	0	6	12	21	5	0.0	6	116.2	8	75.0
TRANSPORTATION	5	13	20	29	7	154.0	7	55.9	9	47.0
WHOLESALE	190	225	257	284	34	18.3	31	14.2	26	10.5
FINANCE	33	41	48	64	7	23.9	7	17.6	15	32.2
SERVICES	46	80	110	176	32	67.7	29	36.9	67	61.1
GOVERNMENT	391	430	466	521	39	10.0	35	8.3	54	11.8
NON-MAN. TOT	682	812	931	1116	129	19.0	118	14.6	184	19.9

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 17										
TOTAL NON-AG.	3268	4222	5092	6240	953	29.2	870	20.6	1148	22.6
MINING	14	16	18	22	2	17.4	2	13.8	3	20.7
CONTRACT CONST	170	205	237	285	35	20.7	32	15.7	48	20.4
MANUF. TOTAL	883	1199	1485	1743	316	35.8	285	23.8	258	17.4
FOOD&KIND.	16	22	22	18	5	35.8	0	-3.2	-3	-14.5
TOBACCO	22	36	44	50	13	60.1	7	21.4	6	14.2
CLOTHING	611	656	687	710	45	7.5	30	4.7	22	3.2
LUMBER	5	7	9	16	1	31.8	2	33.3	7	78.5
PRINTING	21	76	114	160	54	265.7	38	51.1	45	40.3
CHEMICALS	0	16	33	44	16	0.0	16	103.6	11	33.5
STONE	5	18	30	71	12	239.4	12	72.0	41	136.9
PRIMARY MET.	0	16	28	33	15	0.0	11	76.9	5	18.7
MACHINERY	202	325	456	532	122	60.6	131	40.4	75	16.6
OTHER MANUF.	0	28	62	109	28	0.0	33	119.8	46	75.6
TRANSPORTATION	124	162	197	242	38	30.7	34	21.5	44	22.6
WHOLESALE	678	848	1005	1120	170	25.2	156	18.4	114	11.4
FINANCE	102	141	177	256	39	38.6	36	25.7	78	44.3
SERVICES	369	531	680	1023	162	44.0	149	28.1	343	50.5
GOVERNMENT	929	1119	1293	1549	189	20.4	173	15.5	256	19.8
NON-MAN. TOT	2385	3022	3607	4497	637	26.7	584	19.3	889	24.7
BOURBON COUNTY										
TOTAL NON-AG.	3268	4222	5092	6240	953	29.2	870	20.6	1148	22.6
MINING	14	16	18	22	2	17.4	2	13.8	3	20.7
CONTRACT CONST	170	205	237	285	35	20.7	32	15.7	48	20.4
MANUF. TOTAL	883	1199	1485	1743	316	35.8	285	23.8	258	17.4
FOOD&KIND.	16	22	22	18	5	35.8	0	-3.2	-3	-14.5
TOBACCO	22	36	44	50	13	60.1	7	21.4	6	14.2
CLOTHING	611	656	687	710	45	7.5	30	4.7	22	3.2
LUMBER	5	7	9	16	1	31.8	2	33.3	7	78.5
PRINTING	21	76	114	160	54	265.7	38	51.1	45	40.3
CHEMICALS	0	16	33	44	16	0.0	16	103.6	11	33.5
STONE	5	18	30	71	12	239.4	12	72.0	41	136.9
PRIMARY MET.	0	16	28	33	15	0.0	11	76.9	5	18.7
MACHINERY	202	325	456	532	122	60.6	131	40.4	75	16.6
OTHER MANUF.	0	28	62	109	28	0.0	33	119.8	46	75.6
TRANSPORTATION	124	162	197	242	38	30.7	34	21.5	44	22.6
WHOLESALE	678	848	1005	1120	170	25.2	156	18.4	114	11.4
FINANCE	102	141	177	256	39	38.6	36	25.7	78	44.3
SERVICES	369	531	680	1023	162	44.0	149	28.1	343	50.5
GOVERNMENT	929	1119	1293	1549	189	20.4	173	15.5	256	19.8
NON-MAN. TOT	2385	3022	3607	4497	637	26.7	584	19.3	889	24.7

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 16										
TOTAL NON-AG.	27	82	165	437	55	210.1	83	100.9	271	164.1
MINING	0	0	1	2	0	181.8	0	89.5	0	160.2
CONTRACT CONST	1	4	8	20	2	189.7	3	92.7	12	159.5
MANUF. TOTAL	7	23	48	122	16	226.1	24	106.1	73	153.1
FOOD&KIND.	0	0	1	1	0	226.0	0	61.2	0	84.3
TOBACCO	0	1	1	3	0	284.3	0	102.3	2	146.2
CLOTHING	5	13	22	50	7	156.1	9	74.4	27	122.5
LUMBER	0	0	0	1	0	216.4	0	121.9	0	284.6
PRINTING	0	1	4	11	1	778.0	2	151.6	7	202.3
CHEMICALS	0	0	1	3	0	0.0	0	239.1	2	187.7
STONE	0	0	1	5	0	714.8	0	186.5	4	410.5
PRIMARY MET.	0	0	1	2	0	0.0	0	194.6	1	155.8
MACHINERY	2	8	15	37	4	285.5	8	133.8	22	151.4
OTHER MANUF.	0	1	2	8	0	0.0	1	266.0	5	278.4
TRANSPORTATION	1	3	6	17	2	213.8	3	102.4	10	164.2
WHOLESALE	6	17	33	78	11	200.5	16	97.2	45	140.1
FINANCE	1	3	8	16	1	232.8	3	109.3	12	211.1
SERVICES	3	10	22	72	7	245.6	11	113.4	49	224.4
GOVERNMENT	8	22	42	109	14	189.1	20	92.4	66	158.3
NON-MAN. TOT	19	59	117	315	39	204.2	58	98.7	197	168.7
BOURBON COUNTY										
TOTAL NON-AG.	27	82	165	437	55	210.1	83	100.9	271	164.1
MINING	0	0	1	2	0	181.8	0	89.5	0	160.2
CONTRACT CONST	1	4	8	20	2	189.7	3	92.7	12	159.5
MANUF. TOTAL	7	23	48	122	16	226.1	24	106.1	73	153.1
FOOD&KIND.	0	0	1	1	0	226.0	0	61.2	0	84.3
TOBACCO	0	1	1	3	0	284.3	0	102.3	2	146.2
CLOTHING	5	13	22	50	7	156.1	9	74.4	27	122.5
LUMBER	0	0	0	1	0	216.4	0	121.9	0	284.6
PRINTING	0	1	4	11	1	778.0	2	151.6	7	202.3
CHEMICALS	0	0	1	3	0	0.0	0	239.1	2	187.7
STONE	0	0	1	5	0	714.8	0	186.5	4	410.5
PRIMARY MET.	0	0	1	2	0	0.0	0	194.6	1	155.8
MACHINERY	2	8	15	37	4	285.5	8	133.8	22	151.4
OTHER MANUF.	0	1	2	8	0	0.0	1	266.0	5	278.4
TRANSPORTATION	1	3	6	17	2	213.8	3	102.4	10	164.2
WHOLESALE	6	17	33	78	11	200.5	16	97.2	45	140.1
FINANCE	1	3	8	16	1	232.8	3	109.3	12	211.1
SERVICES	3	10	22	72	7	245.6	11	113.4	49	224.4
GOVERNMENT	6	22	42	109	14	189.1	20	92.4	66	158.3
NON-MAN. TOT	19	59	117	315	39	204.2	58	98.7	197	168.7
CLARK COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
MONTGOMERY CO										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 19										
TOTAL NON-AG.	180	244	311	427	64	36.0	67	27.5	116	37.3
MINING	1	1	1	2	0	23.6	0	20.3	0	35.3
CONTRACT CONST	9	12	14	20	2	27.1	2	22.3	5	34.9
MANUF. TOTAL	48	69	91	119	20	43.0	21	30.9	28	31.6
FOOD&KIND.	1	1	1	1	0	43.0	0	2.3	0	-4.2
TOBACCO	1	2	3	3	0	68.5	0	26.4	0	26.0
CLOTHING	34	38	42	49	4	13.2	4	10.7	6	15.7
LUMBER	0	0	1	1	0	38.8	0	40.9	0	99.9
PRINTING	1	4	7	11	3	285.1	2	59.7	3	57.1
CHEMICALS	0	1	2	3	0	0.0	1	115.2	1	49.6
STONE	0	1	2	5	0	257.3	0	61.8	3	165.4
PRIMARY MET.	0	1	2	2	0	0.0	0	87.0	0	33.0
MACHINERY	11	19	28	36	7	69.0	9	48.4	8	30.7
OTHER MANUF.	0	2	4	7	1	0.0	2	132.3	3	96.7
TRANSPORTATION	7	9	12	17	2	37.6	2	26.5	4	37.4
WHOLESALE	37	49	61	77	11	31.8	12	25.2	15	24.8
FINANCE	6	8	11	16	2	46.0	2	32.8	6	61.7
SERVICES	20	31	42	70	10	51.6	10	35.4	28	66.6
GOVERNMENT	51	65	79	106	13	26.8	14	22.1	27	34.3
NON-MAN. TOT	131	175	221	308	43	33.4	45	26.2	87	39.7
BOURBON COUNTY										
TOTAL NON-AG.	180	244	311	427	64	36.0	67	27.5	116	37.3
MINING	1	1	1	2	0	23.6	0	20.3	0	35.3
CONTRACT CONST	9	12	14	20	2	27.1	2	22.3	5	34.9
MANUF. TOTAL	48	69	91	119	20	43.0	21	30.9	28	31.6
FOOD&KIND.	1	1	1	1	0	43.0	0	2.3	0	-4.2
TOBACCO	1	2	3	3	0	68.5	0	26.4	0	26.0
CLOTHING	34	38	42	49	4	13.2	4	10.7	6	15.7
LUMBER	0	0	1	1	0	38.8	0	40.9	0	99.9
PRINTING	1	4	7	11	3	285.1	2	59.7	3	57.1
CHEMICALS	0	1	2	3	0	0.0	1	115.2	1	49.6
STONE	0	1	2	5	0	257.3	0	61.8	3	165.4
PRIMARY MET.	0	1	2	2	0	0.0	0	87.0	0	33.0
MACHINERY	11	19	28	36	7	69.0	9	48.4	8	30.7
OTHER MANUF.	0	2	4	7	1	0.0	2	132.3	3	96.7
TRANSPORTATION	7	9	12	17	2	37.6	2	26.5	4	37.4
WHOLESALE	37	49	61	77	11	31.8	12	25.2	15	24.8
FINANCE	6	8	11	16	2	46.0	2	32.8	6	61.7
SERVICES	20	31	42	70	10	51.6	10	35.4	28	66.6
GOVERNMENT	51	65	79	106	13	26.8	14	22.1	27	34.3
NON-MAN. TOT	131	175	221	308	43	33.4	45	26.2	87	39.7

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 20										
TOTAL NON-AG.	5559	6825	8086	10196	1266	22.8	1260	18.5	2109	26.1
MINING	32	35	39	46	3	10.2	3	9.3	7	18.6
CONTRACT CONST	221	268	316	406	47	21.4	47	17.7	90	28.5
MANUF. TOTAL	2013	2431	2841	3334	417	20.7	410	16.9	492	17.4
FOOD&KIND.	21	29	26	25	7	37.0	0	-1.9	-3	-11.7
TOBACCO	6	25	36	48	17	228.2	11	44.6	12	33.5
CLOTHING	261	349	403	473	67	24.0	53	15.4	70	17.5
LUMBER	300	302	306	317	2	0.7	3	1.1	11	3.9
PRINTING	35	105	159	239	70	203.0	53	51.2	79	50.2
CHEMICALS	112	133	156	175	20	18.5	23	17.6	19	12.6
STONE	6	21	39	107	15	285.0	17	81.8	68	175.2
PRIMARY MET.	331	351	367	377	19	6.0	16	4.7	9	2.6
MACHINERY	910	1069	1254	1399	159	17.5	184	17.3	145	11.6
OTHER MANUF.	10	46	93	172	36	346.0	46	99.9	78	84.7
TRANSPORTATION	595	645	696	776	50	8.5	50	7.8	81	11.7
WHOLESALE	919	1147	1375	1611	227	24.8	228	19.9	235	17.2
FINANCE	151	203	254	390	51	34.3	51	25.6	135	53.3
SERVICES	645	857	1070	1658	212	32.9	212	24.8	588	55.0
GOVERNMENT	983	1239	1496	1975	256	26.0	256	20.7	478	32.0
NON-MAN. TOT	3546	4395	5245	6862	848	23.9	850	19.4	1616	30.8
BOURBON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
CLARK COUNTY										
TOTAL NON-AG.	5559	6825	8086	10196	1266	22.8	1260	18.5	2109	26.1
MINING	32	35	39	46	3	10.2	3	9.3	7	18.6
CONTRACT CONST	221	268	316	406	47	21.4	47	17.7	90	28.5
MANUF. TOTAL	2013	2431	2841	3334	417	20.7	410	16.9	492	17.4
FOOD&KIND.	21	29	26	25	7	37.0	0	-1.9	-3	-11.7
TOBACCO	6	25	36	48	17	228.2	11	44.6	12	33.5
CLOTHING	261	349	403	473	67	24.0	53	15.4	70	17.5
LUMBER	300	302	306	317	2	0.7	3	1.1	11	3.9
PRINTING	35	105	159	239	70	203.0	53	51.2	79	50.2
CHEMICALS	112	133	156	175	20	18.5	23	17.6	19	12.6
STONE	6	21	39	107	15	285.0	17	81.8	68	175.2
PRIMARY MET.	331	351	367	377	19	6.0	16	4.7	9	2.6
MACHINERY	910	1069	1254	1399	159	17.5	184	17.3	145	11.6
OTHER MANUF.	10	46	93	172	36	346.0	46	99.9	78	84.7
TRANSPORTATION	595	645	696	776	50	8.5	50	7.8	81	11.7
WHOLESALE	919	1147	1375	1611	227	24.8	228	19.9	235	17.2
FINANCE	151	203	254	390	51	34.3	51	25.6	135	53.3
SERVICES	645	857	1070	1658	212	32.9	212	24.8	588	55.0
GOVERNMENT	983	1239	1496	1975	256	26.0	256	20.7	478	32.0
NON-MAN. TOT	3546	4395	5245	6862	848	23.9	850	19.4	1616	30.8

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 21										
TOTAL NON-AG.	313	346	380	389	33	10.7	34	9.9	8	2.2
MINING	35	36	36	33	0	1.5	0	1.6	-3	-9.1
CONTRACT CONST	17	17	18	17	0	3.3	0	3.3	-1	-6.5
MANUF. TOTAL	57	63	70	69	5	10.1	6	10.5	0	-0.9
FOOD&KIND.	10	9	8	6	-1	-10.3	-1	-16.1	-1	-17.1
TOBACCO	0	0	0	1	0	0.0	0	17.4	0	63.2
CLOTHING	7	6	5	3	-1	-17.5	-1	-22.1	-1	-25.0
LUMBER	5	6	7	7	0	16.6	0	17.6	0	7.4
PRINTING	2	3	4	5	0	58.4	1	42.8	1	42.2
CHEMICALS	0	1	2	3	0	0.0	1	119.0	0	45.1
STONE	0	0	1	1	0	0.0	0	123.2	0	56.0
PRIMARY MET.	0	0	0	1	0	0.0	0	114.2	0	148.2
MACHINERY	33	38	43	41	4	14.3	5	14.2	-2	-5.9
OTHER MANUF.	0	0	0	0	0	0.0	0	102.9	0	160.7
TRANSPORTATION	14	14	14	13	0	1.4	0	1.4	-1	-9.3
WHOLESALE	72	80	89	87	8	11.1	8	10.1	-1	-2.2
FINANCE	7	8	9	10	0	13.9	0	12.3	0	10.8
SERVICES	10	24	33	48	8	51.0	8	33.7	15	46.7
GOVERNMENT	95	104	113	113	8	9.5	9	8.7	0	0.6
NON-MAN. TOT	255	283	311	320	27	10.8	27	9.8	9	3.0
BRACKEN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
PENDLETON COUNTY										
TOTAL NON-AG.	313	346	380	389	33	10.7	34	9.9	8	2.2
MINING	35	36	36	33	0	1.5	0	1.6	-3	-9.1
CONTRACT CONST	17	17	18	17	0	3.3	0	3.3	-1	-6.5
MANUF. TOTAL	57	63	70	69	5	10.1	6	10.5	0	-0.9
FOOD&KIND.	10	9	8	6	-1	-10.3	-1	-16.1	-1	-17.1
TOBACCO	0	0	0	1	0	0.0	0	117.4	0	63.2
CLOTHING	7	6	5	3	-1	-17.5	-1	-22.1	-1	-25.0
LUMBER	5	6	7	7	0	16.6	0	17.6	0	7.4
PRINTING	2	3	4	5	0	58.4	1	42.8	1	42.2
CHEMICALS	0	1	2	3	0	0.0	1	119.0	0	45.1
STONE	0	0	1	1	0	0.0	0	123.2	0	56.6
PRIMARY MET.	0	0	0	1	0	0.0	0	114.2	0	148.2
MACHINERY	33	36	43	41	4	14.3	5	14.2	-2	-5.9
OTHER MANUF.	0	0	0	0	0	0.0	0	102.9	0	160.7
TRANSPORTATION	14	14	14	13	0	1.4	0	1.4	-1	-9.3
WHOLESALE	72	80	89	87	8	11.1	8	10.1	-1	-2.2
FINANCE	7	8	9	10	0	13.9	0	12.3	0	10.8
SERVICES	16	24	33	48	8	51.0	8	33.7	15	46.7
GOVERNMENT	95	104	113	113	8	9.5	9	8.7	0	0.6
NON-MAN. TOT	255	283	311	320	27	10.8	27	9.8	9	3.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 22										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 23										
TOTAL NON-AG.	363	469	570	788	106	29.4	100	21.4	218	38.4
MINING	1	1	2	3	0	46.1	0	37.2	1	69.9
CONTRACT CONST	8	8	8	8	0	0.1	0	0.1	0	4.6
MANUF. TOTAL	163	231	290	384	67	41.1	59	25.7	93	32.4
FOOD&KIND.	8	11	11	10	2	30.3	0	-2.6	0	-7.4
TOBACCO	8	11	14	15	2	29.8	2	27.5	1	9.7
CLOTHING	25	68	102	143	42	171.4	34	50.8	41	40.6
LUMBER	0	1	1	3	1	0.0	0	18.0	1	115.9
PRINTING	1	1	1	2	0	7.3	0	6.4	0	21.8
CHEMICALS	76	82	92	101	6	8.2	9	11.7	9	10.9
STONE	3	3	3	4	0	8.0	0	6.2	0	3.8
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	42	54	66	106	11	28.3	12	22.4	39	60.8
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	17	16	15	19	-1	-6.5	-1	-7.0	3	23.7
WHOLESALE	65	72	80	91	7	10.9	7	10.3	10	13.2
FINANCE	12	13	14	19	1	10.7	1	10.3	4	32.3
SERVICES	34	48	64	117	14	44.2	15	32.0	53	83.0
GOVERNMENT	63	80	97	148	16	26.7	17	22.0	51	52.8
NON-MAN. TOT	199	239	280	405	39	19.7	41	17.3	124	44.5
BRACKEN COUNTY										
TOTAL NON-AG.	172	238	302	439	66	38.5	64	27.1	136	45.2
MINING	0	0	1	1	0	0.0	0	121.4	0	151.6
CONTRACT CONST	4	4	4	4	0	0.0	0	-0.0	0	-0.0
MANUF. TOTAL	83	124	162	225	41	50.5	37	30.6	63	38.9
FOOD&KIND.	4	6	6	5	1	38.2	0	-2.6	0	-6.1
TOBACCO	1	2	4	5	1	266.7	1	90.0	0	20.1
CLOTHING	0	26	49	76	26	0.0	22	83.3	27	56.0
LUMBER	0	1	1	2	0	0.0	0	16.9	1	127.3
PRINTING	0	0	0	1	0	15.0	0	13.0	0	46.2
CHEMICALS	75	79	85	92	3	5.1	6	7.6	6	7.6
STONE	2	2	3	3	0	6.7	0	5.5	0	3.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	7	15	43	7	0.0	7	105.1	27	182.8
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	8	8	7	7	0	-6.8	0	-7.3	0	-0.0
WHOLESALE	25	30	35	41	4	17.3	4	16.0	6	16.6
FINANCE	6	6	7	10	0	13.7	0	13.2	2	39.6
SERVICES	8	17	27	63	9	121.7	9	59.4	36	134.9
GOVERNMENT	36	46	60	87	10	27.0	11	23.0	27	45.7
NON-MAN. TOT	89	113	140	213	24	27.4	26	23.3	73	52.5
MASON COUNTY										
TOTAL NON-AG.	187	227	261	313	39	21.0	34	15.4	51	19.7
MINING	1	1	1	2	0	17.1	0	16.1	0	26.7
CONTRACT CONST	4	4	4	4	0	-0.0	0	-0.0	0	-0.1
MANUF. TOTAL	81	106	126	150	24	30.9	20	19.5	23	18.7
FOOD&KIND.	4	5	5	5	0	22.1	0	-2.7	0	-6.4
TOBACCO	8	9	10	10	0	11.8	1	12.0	0	3.1
CLOTHING	25	41	53	63	15	63.6	12	29.4	10	19.5
LUMBER	0	0	0	1	0	0.0	0	16.3	0	80.5
PRINTING	1	1	1	1	0	3.9	0	3.4	0	8.2
CHEMICALS	1	3	6	9	2	410.5	3	117.5	2	40.6
STONE	1	1	1	1	0	11.7	0	8.1	0	3.5
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	42	46	58	61	4	10.5	4	9.1	10	20.8
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	8	7	7	7	0	-6.8	0	-7.5	0	-0.1
WHOLESALE	40	42	45	47	2	5.7	2	6.2	2	5.4
FINANCE	6	6	7	8	0	7.7	0	7.3	1	15.9
SERVICES	26	31	37	51	5	21.3	5	17.2	13	37.2
GOVERNMENT	22	28	34	45	6	27.8	6	21.4	10	30.1
NON-MAN. TOT	106	121	135	163	14	13.5	14	11.7	27	20.7

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
ROBERTSON CO										
TOTAL NON-AG.	4	5	6	37	1	30.3	1	23.6	30	482.4
MINING	0	0	0	0	0	0.0	0	169.1	0	799.3
CONTRACT CONST	0	0	0	0	0	6.7	0	7.6	0	399.6
MANUF. TOTAL	0	1	1	8	0	0.0	0	91.0	7	604.1
FOOD&KIND.	0	0	0	0	0	0.0	0	7.6	0	363.9
TOBACCO	0	0	0	0	0	0.0	0	115.3	0	453.1
CLOTHING	0	0	1	5	0	0.0	0	83.8	3	542.9
LUMBER	0	0	0	0	0	0.0	0	25.6	0	756.5
PRINTING	0	0	0	0	0	0.0	0	7.6	0	899.2
CHEMICALS	0	0	0	1	0	0.0	0	152.2	0	570.2
STONE	0	0	0	0	0	0.0	0	115.3	0	649.4
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	2	0	0.0	0	103.9	1	675.2
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	1	1	1	4	0	-0.4	0	-0.5	3	399.6
WHOLESALE	0	0	0	2	0	39.6	0	31.1	1	464.8
FINANCE	0	0	0	1	0	19.2	0	17.3	0	488.6
SERVICES	0	0	0	4	0	80.6	0	47.9	3	678.9
GOVERNMENT	2	3	3	17	0	13.0	0	13.0	13	432.5
NON-REM. TOT	4	5	5	29	0	14.6	0	14.2	23	454.5

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 24										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 25										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 20										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
LEWIS COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
MASON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 27										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 28										
TOTAL NON-AG.	369	461	541	967	92	25.0	79	17.2	426	78.9
MINING	1	1	2	4	0	65.0	0	49.9	2	194.2
CONTRACT CONST	12	13	14	35	1	9.7	1	9.2	21	156.0
MANUF. TOTAL	19	78	126	269	59	320.7	48	62.1	142	113.0
FOOD&KIND.	1	3	2	2	1	147.8	0	-3.5	0	-1.1
TOBACCO	1	3	4	5	1	130.5	1	56.7	0	11.0
CLOTHING	7	38	59	102	30	445.8	21	57.2	42	71.4
LUMBER	1	1	2	7	0	194.2	0	37.0	4	227.5
PRINTING	1	1	1	3	0	46.8	0	23.6	1	210.0
CHEMICALS	0	4	10	14	4	*****	5	129.8	4	46.9
STONE	0	0	0	0	0	96.5	0	46.5	0	25.7
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	6	28	47	136	19	245.6	18	67.5	88	188.5
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	66	62	57	68	-4	-6.1	-4	-6.8	10	16.9
WHOLESALE	36	42	49	95	6	16.7	6	15.0	45	93.6
FINANCE	10	11	12	23	1	11.0	0	9.1	10	91.5
SERVICES	20	32	42	89	11	55.6	10	33.2	46	111.1
GOVERNMENT	207	223	238	383	16	7.9	15	6.9	144	60.7
NON-MAN. TOT	350	383	414	698	32	9.4	30	8.0	283	68.5
BATH COUNTY										
TOTAL NON-AG.	75	107	138	516	31	42.1	31	29.1	377	273.6
MINING	0	0	1	3	0	0.0	0	107.2	2	447.1
CONTRACT CONST	6	7	8	30	1	21.1	1	16.2	21	269.0
MANUF. TOTAL	1	19	36	150	18	*****	17	89.1	113	314.8
FOOD&KIND.	0	0	0	0	0	-8.2	0	-14.9	0	90.3
TOBACCO	0	0	0	0	0	0.0	0	112.7	0	565.2
CLOTHING	0	5	8	38	4	0.0	3	74.7	30	372.6
LUMBER	0	1	1	5	0	70.3	0	63.4	4	343.1
PRINTING	0	0	1	2	0	44.6	0	37.5	1	281.4
CHEMICALS	0	0	0	2	0	0.0	0	108.4	1	420.4
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	13	26	101	12	0.0	12	99.0	75	295.5
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	6	7	7	21	0	2.7	0	2.8	14	209.3
WHOLESALE	14	17	20	62	2	19.4	2	16.8	42	220.2
FINANCE	3	3	3	13	0	13.8	0	13.0	9	264.2
SERVICES	4	6	8	39	2	56.8	2	36.0	30	366.7
GOVERNMENT	42	49	56	198	6	16.0	8	14.3	142	255.8
NON-MAN. TOT	74	88	102	366	13	16.2	14	16.0	263	259.2
BRACKEN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
FLEMING COUNTY										
TOTAL NON-AG.	14	13	11	23	0	-5.0	-1	-15.2	11	105.0
MINING	0	0	0	1	0	-16.3	0	-22.9	0	80.2
CONTRACT CONST	0	0	0	0	0	-17.9	0	-24.4	0	72.3
MANUF. TOTAL	5	5	4	9	0	6.7	0	-9.7	4	109.8
FOOD&KIND.	0	0	0	0	0	23.7	0	-26.2	0	57.8
TOBACCO	0	0	0	0	0	0.0	0	62.2	0	104.5
CLOTHING	3	3	3	6	0	6.7	0	-11.0	2	98.1
LUMBER	0	0	0	0	0	2.9	0	-21.6	0	109.4
PRINTING	0	0	0	0	0	-12.9	0	-20.2	0	99.9
CHEMICALS	0	0	0	1	0	0.0	0	88.5	0	161.5
STONE	0	0	0	0	0	0.0	0	32.2	0	121.5
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	1	1	1	3	0	-4.1	0	-13.9	1	133.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	1	1	0	1	0	-23.4	0	-30.1	0	72.3
WHOLESALE	3	2	2	3	0	-13.4	0	-20.5	1	81.5
FINANCE	0	0	0	1	0	-11.8	0	-19.1	0	103.3
SERVICES	1	1	1	2	0	16.3	0	-2.2	1	186.7
GOVERNMENT	4	3	3	5	0	-10.2	0	-17.9	2	99.2
NON-MAN. TOT	9	8	7	13	0	-10.9	-1	-18.5	6	101.8
HARRISON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL NON-AG.	30	36	42	50	6	21.2	5	15.5	8	20.4
MINING	0	0	0	0	0	17.3	0	16.3	0	27.4
CONTRACT CONST	1	1	1	1	0	0.1	0	0.1	0	0.5
MANUF. TOTAL	13	17	20	24	4	31.1	3	19.7	3	19.4
FOOD&KIND.	1	1	1	1	0	22.3	0	-2.6	0	-7.8
TOBACCO	1	1	2	2	0	12.0	0	12.2	0	3.7
CLOTHING	4	7	8	10	2	63.9	1	29.6	1	20.2
LUMBER	0	0	0	0	0	0.0	0	16.4	0	81.6
PRINTING	0	0	0	0	0	4.1	0	3.6	0	8.9
CHEMICALS	0	0	1	1	0	411.3	0	117.8	0	41.4
STONE	0	0	0	0	0	11.9	0	8.3	0	4.1
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	7	7	8	10	0	10.7	0	9.3	1	21.5
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	1	1	1	1	0	-6.6	0	-7.3	0	0.5
WHOLESALE	6	7	7	8	0	6.8	0	6.3	0	6.0
FINANCE	1	1	1	1	0	7.9	0	7.4	0	16.6
SERVICES	4	5	6	8	0	21.5	0	17.4	2	38.0
GOVERNMENT	4	5	6	7	0	28.0	0	21.6	1	30.8
NON-MAN. TOT	17	19	22	26	2	13.7	2	11.9	4	21.4

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
NICHOLAS COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
ROBERTSON CO										
TOTAL NON-AG.	250	305	350	378	54	22.0	44	14.7	28	8.1
MINING	0	0	0	1	0	0.0	0	149.7	0	67.0
CONTRACT CONST	5	5	5	5	0	-0.1	0	-0.1	0	-7.2
MANUF. TOTAL	0	37	66	86	36	0.0	28	77.2	20	30.7
FOOD&KIND.	0	1	1	1	1	0.0	0	-0.1	0	-13.9
TOBACCO	0	1	3	3	1	0.0	1	99.7	0	2.7
CLOTHING	0	24	40	48	23	0.0	16	70.5	7	19.4
LUMBER	0	1	1	1	0	0.0	0	16.5	0	59.0
PRINTING	0	0	0	0	0	0.0	0	-0.1	0	85.5
CHEMICALS	0	3	6	10	3	0.0	4	134.0	1	24.4
STONE	0	0	0	0	0	0.0	0	99.7	0	39.1
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	6	12	22	6	0.0	5	89.2	9	81.1
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	57	53	49	46	-3	-6.6	-4	-7.7	-3	-7.2
WHOLESALE	13	17	20	21	3	30.6	3	21.6	0	4.9
FINANCE	6	7	7	8	0	11.5	0	8.8	0	9.3
SERVICES	12	20	27	40	8	69.0	7	37.3	12	44.6
GOVERNMENT	158	166	175	173	8	5.7	8	4.9	-1	-1.1
NON-MAN. TOT	250	268	284	292	18	7.2	15	6.0	8	3.0
ROWAN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 29										
TOTAL NON-AG.	2226	2579	2900	3442	353	15.9	320	12.4	542	18.7
MINING	75	76	78	81	1	2.0	1	2.2	3	4.3
CONTRACT CONST	63	63	63	63	0	0.1	0	0.1	0	-0.3
MANUF. TOTAL	750	976	1168	1419	225	30.1	192	19.7	250	21.5
FOOD&KIND.	17	25	25	23	8	50.8	0	-2.2	-2	-8.7
TOBACCO	0	8	16	21	8	0.0	9	114.9	3	16.4
CLOTHING	477	621	732	840	143	30.1	111	18.0	107	14.7
LUMBER	15	19	19	24	3	25.5	0	3.9	4	21.2
PRINTING	5	5	6	6	0	6.1	0	5.8	0	15.8
CHEMICALS	0	21	52	78	20	0.0	31	149.8	26	51.4
STONE	0	1	1	2	0	0.0	0	75.2	0	28.2
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	237	276	316	426	39	16.9	39	14.1	110	34.9
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	138	129	119	119	-9	-6.7	-9	-7.4	0	-0.3
WHOLESALE	433	458	482	507	24	5.6	24	5.4	24	5.1
FINANCE	57	61	65	77	4	7.5	4	7.2	11	17.7
SERVICES	119	169	219	364	49	41.8	50	29.6	144	66.0
GOVERNMENT	591	646	704	812	56	9.5	56	8.8	107	15.3
NON-MAN. TOT	1476	1603	1731	2023	127	8.6	128	8.0	291	16.8
FLEMING COUNTY										
TOTAL NON-AG.	2226	2579	2900	3442	353	15.9	320	12.4	542	18.7
MINING	75	76	78	81	1	2.0	1	2.2	3	4.3
CONTRACT CONST	63	63	63	63	0	0.1	0	0.1	0	-0.3
MANUF. TOTAL	750	976	1168	1419	225	30.1	192	19.7	250	21.5
FOOD&KIND.	17	25	25	23	8	50.8	0	-2.2	-2	-8.7
TOBACCO	0	8	16	21	8	0.0	9	114.9	3	16.4
CLOTHING	477	621	732	840	143	30.1	111	18.0	107	14.7
LUMBER	15	19	19	24	3	25.5	0	3.9	4	21.2
PRINTING	5	5	6	6	0	6.1	0	5.8	0	15.8
CHEMICALS	0	21	52	78	20	0.0	31	149.8	26	51.4
STONE	0	1	1	2	0	0.0	0	75.2	0	28.2
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	237	276	316	426	39	16.9	39	14.1	110	34.9
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	138	129	119	119	-9	-6.7	-9	-7.4	0	-0.3
WHOLESALE	433	458	482	507	24	5.6	24	5.4	24	5.1
FINANCE	57	61	65	77	4	7.5	4	7.2	11	17.7
SERVICES	119	169	219	364	49	41.8	50	29.6	144	66.0
GOVERNMENT	591	648	704	812	56	9.5	56	8.8	107	15.3
NON-MAN. TOT	1476	1603	1731	2023	127	8.6	128	8.0	291	16.8
NICHOLAS COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 30										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 31										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 32										
TOTAL NON-AG.	1138	1491	1891	3824	353	31.1	399	26.8	1933	102.3
MINING	1	4	7	20	2	205.7	3	80.9	13	186.6
CONTRACT CONST	60	76	94	181	15	26.5	18	24.8	86	91.6
MANUF. TOTAL	327	499	684	1567	172	52.7	185	37.1	883	129.1
FOOD&KIND.	6	7	6	9	0	-9.1	0	-13.5	2	45.5
TOBACCO	1	2	2	5	0	6.7	0	14.1	3	189.4
CLOTHING	69	133	169	421	43	48.5	35	27.1	252	149.9
LUMBER	3	7	13	30	3	129.9	5	88.5	16	132.9
PRINTING	4	6	8	16	1	44.7	2	42.1	8	100.6
CHEMICALS	0	2	5	14	2	0.0	2	119.8	9	178.5
STONE	5	4	3	6	-1	-26.5	-1	-30.1	3	133.7
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	216	339	479	1066	122	56.8	139	41.2	586	122.5
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	56	62	69	99	5	10.3	6	11.1	30	44.6
WHOLESALE	213	243	280	503	29	14.0	36	15.2	223	79.6
FINANCE	34	39	45	93	4	13.9	5	15.2	47	105.4
SERVICES	69	91	116	303	22	32.4	26	29.0	185	157.7
GOVERNMENT	377	477	594	1058	100	26.5	116	24.3	464	78.2
NON-MAN. TOT	811	992	1207	2257	181	22.4	214	21.6	1050	87.0
BATH COUNTY										
TOTAL NON-AG.	542	821	1136	1351	278	51.4	315	38.5	214	18.9
MINING	0	2	4	7	1	0.0	2	122.3	3	74.0
CONTRACT CONST	41	52	67	78	11	29.1	14	26.9	11	17.3
MANUF. TOTAL	7	147	296	393	139	*****	151	102.9	95	31.9
FOOD&KIND.	2	2	2	1	0	-2.1	0	-8.7	0	-39.5
TOBACCO	0	0	0	1	0	0.0	0	128.3	0	117.9
CLOTHING	0	36	67	100	35	0.0	31	87.4	33	50.3
LUMBER	3	6	10	14	2	87.9	4	75.3	3	40.9
PRINTING	2	4	5	6	1	54.1	1	47.5	1	21.3
CHEMICALS	0	2	4	6	1	0.0	1	123.6	2	65.5
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	99	211	265	98	0.0	111	113.6	54	25.8
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	46	50	55	55	4	9.4	5	10.3	0	-1.7
WHOLESALE	101	128	161	164	27	27.2	32	25.3	2	1.8
FINANCE	19	24	29	35	4	21.3	5	21.3	6	22.2
SERVICES	20	44	65	101	17	69.3	21	48.1	35	55.4
GOVERNMENT	302	373	456	518	71	23.6	84	22.6	60	13.1
NON-MAN. TOT	535	674	830	956	136	26.0	164	24.4	119	14.2
BENEFEE COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
MONTGOMERY CO										
TOTAL NON-AG.	596	671	755	2474	74	12.6	83	12.5	1719	227.9
MINING	1	2	3	13	0	56.6	0	42.4	10	349.5
CONTRACT CONST	19	23	28	102	4	21.1	4	20.0	74	270.1
MANUF. TOTAL	320	352	386	1174	32	10.1	33	9.6	788	204.1
FOOD&KIND.	6	5	4	8	0	-11.1	0	-15.1	3	75.6
TOBACCO	1	1	1	4	0	-5.6	0	-0.7	2	210.7
CLOTHING	89	97	102	321	7	8.6	4	5.0	219	215.2
LUMBER	0	1	3	16	1	0.0	1	147.7	13	424.1
PRINTING	2	2	3	10	0	30.1	0	32.1	6	262.4
CHEMICALS	0	1	2	9	0	0.0	0	111.7	6	435.0
STONE	5	4	3	6	-1	-26.5	-1	-30.1	3	133.7
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	216	241	268	801	24	11.3	27	11.0	532	198.3
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	10	12	13	45	1	14.1	1	14.5	31	236.2
WHOLESALE	113	115	120	340	2	2.2	4	3.9	220	183.9
FINANCE	15	16	17	58	0	4.2	0	6.1	41	249.5
SERVICES	43	47	53	202	4	10.1	5	11.2	149	284.2
GOVERNMENT	75	104	136	540	28	38.3	31	30.5	403	297.6
NON-MAN. TOT	276	319	368	1300	42	15.4	49	15.6	931	252.7

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 33										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MONTGOMERY CO										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 34										
TOTAL NON-AG.	176	283	409	537	104	58.4	126	44.9	128	31.3
MINING	0	1	2	3	0	0.0	0	132.6	1	92.1
CONTRACT CONST	13	18	24	31	4	35.1	5	32.7	7	29.6
MANUF. TOTAL	2	51	107	156	48	*****	56	112.3	49	45.7
FOOD&KIND.	1	1	1	0	0	2.4	0	-4.5	0	-33.2
TOBACCO	0	0	0	0	0	0.0	0	138.8	0	140.6
CLOTHING	0	12	24	40	12	0.0	11	96.1	15	66.0
LUMBER	1	2	3	5	0	96.6	1	83.4	1	55.6
PRINTING	1	1	2	3	0	61.3	0	54.3	0	34.0
CHEMICALS	0	1	1	2	0	0.0	0	133.9	1	82.8
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	34	76	105	33	0.0	41	123.4	29	38.9
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	15	17	20	22	2	14.5	2	15.4	1	8.6
WHOLESALE	33	44	58	65	10	33.1	13	31.1	7	12.4
FINANCE	6	8	10	14	1	26.9	2	26.9	3	34.9
SERVICES	9	15	23	40	6	77.1	8	54.9	16	71.6
GOVERNMENT	99	129	165	206	29	29.3	36	28.3	41	25.0
NON-MAN. TOT	176	232	302	381	56	31.8	70	30.2	78	26.1
BATH COUNTY										
TOTAL NON-AG.	176	283	409	537	104	58.4	126	44.9	128	31.3
MINING	0	1	2	3	0	0.0	0	132.6	1	92.1
CONTRACT CONST	13	18	24	31	4	35.1	5	32.7	7	29.6
MANUF. TOTAL	2	51	107	156	48	*****	56	112.3	49	45.7
FOOD&KIND.	1	1	1	0	0	2.4	0	-4.5	0	-33.2
TOBACCO	0	0	0	0	0	0.0	0	138.8	0	140.6
CLOTHING	0	12	24	40	12	0.0	11	96.1	15	66.0
LUMBER	1	2	3	5	0	96.6	1	83.4	1	55.6
PRINTING	1	1	2	3	0	61.3	0	54.3	0	34.0
CHEMICALS	0	1	1	2	0	0.0	0	133.9	1	82.8
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	34	76	105	33	0.0	41	123.4	29	38.9
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	15	17	20	22	2	14.5	2	15.4	1	8.6
WHOLESALE	33	44	58	65	10	33.1	13	31.1	7	12.4
FINANCE	6	8	10	14	1	26.9	2	26.9	3	34.9
SERVICES	9	15	23	40	6	77.1	8	54.9	16	71.6
GOVERNMENT	99	129	165	206	29	29.3	36	28.3	41	25.0
NON-MAN. TOT	176	232	302	381	56	31.8	70	30.2	78	26.1
BENTON COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 35										
TOTAL NON-AG.	4119	5883	8024	11016	1763	42.8	2141	36.4	2991	37.3
MINING	59	70	86	115	11	19.9	15	21.8	29	34.0
CONTRACT CONST	156	236	335	503	77	49.3	98	41.7	168	50.3
MANUF. TOTAL	724	1565	2545	3627	841	116.2	980	62.6	1081	42.5
FOOD&KIND.	34	33	32	22	0	-1.1	-1	-5.6	-9	-29.8
TOBACCO	24	25	27	30	0	3.8	1	6.9	3	15.0
CLOTHING	234	452	659	1000	218	93.3	206	45.7	340	51.7
LUMBER	247	263	291	332	16	6.6	27	10.6	40	14.0
PRINTING	45	53	65	80	8	18.1	11	22.5	14	22.8
CHEMICALS	51	61	74	96	9	19.5	13	21.6	22	30.4
STONE	90	73	57	53	-16	-18.3	-16	-22.4	-3	-6.1
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	604	1342	2014	604	0.0	737	122.1	671	50.1
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	244	276	317	375	32	13.3	40	14.8	57	18.1
WHOLESALE	639	821	1049	1256	181	28.4	228	27.8	208	19.9
FINANCE	72	100	135	219	27	39.0	35	35.9	83	61.8
SERVICES	339	453	596	954	113	33.4	142	31.5	357	60.0
GOVERNMENT	1864	2361	2961	3966	477	25.3	599	25.4	1005	34.0
NON-MAN. TOT	3395	4318	5479	7389	922	27.2	1161	26.9	1910	34.9
ROWAN COUNTY										
TOTAL NON-AG.	4119	5883	8024	11016	1763	42.8	2141	36.4	2991	37.3
MINING	59	70	86	115	11	19.9	15	21.8	29	34.0
CONTRACT CONST	156	236	335	503	77	49.3	98	41.7	168	50.3
MANUF. TOTAL	724	1565	2545	3627	841	116.2	980	62.6	1081	42.5
FOOD&KIND.	34	33	32	22	0	-1.1	-1	-5.6	-9	-29.8
TOBACCO	24	25	27	30	0	3.8	1	6.9	3	15.0
CLOTHING	234	452	659	1000	218	93.3	206	45.7	340	51.7
LUMBER	247	263	291	332	16	6.6	27	10.6	40	14.0
PRINTING	45	53	65	80	8	18.1	11	22.5	14	22.8
CHEMICALS	51	61	74	96	9	19.5	13	21.6	22	30.4
STONE	90	73	57	53	-16	-18.3	-16	-22.4	-3	-6.1
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	604	1342	2014	604	0.0	737	122.1	671	50.1
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	244	276	317	375	32	13.3	40	14.8	57	18.1
WHOLESALE	639	821	1049	1256	181	28.4	228	27.8	208	19.9
FINANCE	72	100	135	219	27	39.0	35	35.9	83	61.8
SERVICES	339	453	596	954	113	33.4	142	31.5	357	60.0
GOVERNMENT	1864	2361	2961	3966	477	25.3	599	25.4	1005	34.0
NON-MAN. TOT	3395	4318	5479	7389	922	27.2	1161	26.9	1910	34.9

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 36										
TOTAL NON-AG.	1458	1741	2026	2371	283	19.4	286	16.5	345	16.9
MINING	34	36	38	42	1	5.3	2	5.6	3	8.9
CONTRACT CONST	92	104	118	136	12	13.0	13	12.5	18	15.7
MANUF. TOTAL	297	434	567	687	136	46.0	132	30.6	120	21.2
FOOD&KIND.	1	1	1	1	0	-1.6	0	-10.7	0	-8.0
TOBACCO	0	0	0	1	0	87.8	0	146.6	0	111.0
CLOTHING	190	225	253	289	35	18.4	27	12.3	36	14.4
LUMBER	89	92	95	101	2	2.8	3	3.9	6	6.4
PRINTING	10	12	13	15	1	12.9	1	13.2	1	14.9
CHEMICALS	0	2	3	6	1	675.4	1	98.9	2	77.1
STONE	6	5	4	4	-1	-18.9	-1	-22.9	0	4.4
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	97	196	269	97	0.0	99	101.8	72	37.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	88	93	99	107	5	5.8	5	5.7	8	8.4
WHOLESALE	232	261	292	320	28	12.4	30	11.6	28	9.8
FINANCE	16	21	26	35	4	27.3	4	22.5	8	34.6
SERVICES	48	66	85	122	18	37.9	19	28.9	37	44.0
GOVERNMENT	649	725	805	923	75	11.7	79	11.0	116	14.7
NON-MAN. TOT	1160	1307	1461	1684	146	12.6	154	11.8	223	15.3
BATH COUNTY										
TOTAL NON-AG.	3	5	6	28	1	42.4	1	29.4	22	369.9
MINING	0	0	0	0	0	0.0	0	107.8	0	587.8
CONTRACT CONST	0	0	0	2	0	21.4	0	18.5	1	363.9
MANUF. TOTAL	0	1	2	8	0	*****	0	89.6	6	421.5
FOOD&KIND.	0	0	0	0	0	-8.0	0	-14.7	0	139.3
TOBACCO	0	0	0	0	0	0.0	0	113.3	0	761.4
CLOTHING	0	0	0	2	0	0.0	0	75.1	1	494.1
LUMBER	0	0	0	0	0	76.7	0	63.8	0	457.0
PRINTING	0	0	0	0	0	45.0	0	37.8	0	379.5
CHEMICALS	0	0	0	0	0	0.0	0	108.9	0	554.2
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	1	1	6	0	0.0	0	99.6	4	397.2
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	1	0	2.9	0	3.0	0	288.8
WHOLESALE	1	1	1	3	0	19.6	0	17.1	2	302.5
FINANCE	0	0	0	1	0	14.1	0	13.3	0	383.0
SERVICES	0	0	0	2	0	59.2	0	38.4	1	514.4
GOVERNMENT	2	2	2	11	0	16.2	0	14.6	8	347.3
NON-MAN. TOT	3	4	4	20	0	18.5	0	16.3	15	351.6
ELLIOTT COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
MAGOFFIN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MORGAN COUNTY										
TOTAL NON-AG.	1436	1713	1993	2224	276	19.3	280	16.4	230	11.6
MINING	34	36	38	40	1	5.3	1	5.6	2	6.1
CONTRACT CONST	91	103	116	129	12	13.4	12	12.4	12	11.2
MANUF. TOTAL	294	427	556	639	132	45.2	129	30.2	83	15.0
FOOD&KIND.	1	1	1	1	0	0.0	0	-10.0	0	-22.2
TOBACCO	0	0	0	1	0	0.0	0	300.0	0	75.1
CLOTHING	169	223	250	276	34	15.0	26	12.1	26	10.4
LUMBER	88	90	94	97	2	2.8	3	4.0	3	3.5
PRINTING	10	11	13	14	1	13.0	1	13.3	1	9.4
CHEMICALS	0	1	3	5	1	0.0	1	113.3	1	56.3
STONE	6	5	4	4	-1	-16.3	-1	-22.4	0	-5.2
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	94	191	242	94	0.0	96	101.9	51	27.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	87	92	97	102	5	5.9	5	5.8	4	4.7
WHOLESALE	229	257	287	303	28	12.4	29	11.6	16	5.7
FINANCE	16	20	25	31	4	27.5	4	22.5	6	25.6
SERVICES	46	64	82	110	17	36.5	18	29.2	27	33.2
GOVERNMENT	639	713	792	869	74	11.7	78	10.9	77	9.8
NON-MAN. TOT	1142	1286	1437	1584	143	12.6	151	11.8	147	10.2

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
ROWAN COUNTY										
TOTAL NON-AG.	18	23	28	119	5	27.5	5	21.9	90	317.7
MINING	0	0	0	1	0	7.0	0	8.8	0	307.7
CONTRACT CONST	1	1	1	5	0	33.3	0	26.6	4	357.4
MANUF. TOTAL	3	6	9	39	2	93.1	2	45.3	30	333.5
FOOD&KIND.	0	0	0	0	0	-11.7	0	-15.7	0	113.5
TOBACCO	0	0	0	0	0	-7.3	0	-4.5	0	249.8
CLOTHING	1	2	2	11	0	72.6	0	30.1	8	361.6
LUMBER	1	1	1	4	0	-4.8	0	-1.2	2	246.9
PRINTING	0	0	0	1	0	5.4	0	9.4	0	273.6
CHEMICALS	0	0	0	1	0	6.7	0	8.6	0	296.8
STONE	0	0	0	1	0	-27.1	0	-30.7	0	185.6
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	2	5	22	2	0.0	2	98.4	16	356.6
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	1	1	1	4	0	1.2	0	2.6	2	259.2
WHOLESALE	3	3	4	14	0	14.7	0	14.2	9	264.8
FINANCE	0	0	0	2	0	24.1	0	21.4	1	392.3
SERVICES	2	2	2	10	0	19.1	0	17.5	8	386.9
GOVERNMENT	8	9	10	43	0	11.9	1	12.0	32	307.6
NON-MAN. TOT	15	17	19	80	2	13.6	2	13.4	60	310.4

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 37										
TOTAL NON-AG.	322	425	535	653	102	32.0	110	26.0	117	21.9
MINING	0	1	2	3	0	0.0	0	114.3	1	73.3
CONTRACT CONST	2	7	12	18	4	225.0	5	76.9	6	57.4
MANUF. TOTAL	28	78	129	171	49	177.1	51	65.9	42	33.1
FOODSKIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	-0.0	0	200.0
CLOTHING	0	13	23	36	12	0.0	10	84.1	13	56.9
LUMBER	28	29	30	32	0	3.2	1	5.2	1	5.3
PRINTING	0	1	1	2	0	0.0	0	120.0	0	54.5
CHEMICALS	0	1	1	2	0	0.0	0	100.0	0	75.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	35	73	99	35	0.0	37	107.7	26	35.9
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	3	5	7	9	1	63.3	2	42.9	2	31.4
WHOLESALE	66	71	82	90	10	17.5	11	16.6	8	10.0
FINANCE	0	2	3	7	1	0.0	1	112.5	3	97.1
SERVICES	9	16	23	37	6	73.3	7	46.6	13	60.3
GOVERNMENT	220	248	278	318	27	12.5	30	12.4	39	14.1
NON-MAN. TOT	294	347	407	481	53	18.1	59	17.1	74	18.4
MEMPER COUNTY										
TOTAL NON-AG.	322	425	535	653	102	32.0	110	26.0	117	21.9
MINING	0	1	2	3	0	0.0	0	114.3	1	73.3
CONTRACT CONST	2	7	12	18	4	225.0	5	76.9	6	57.4
MANUF. TOTAL	28	78	129	171	49	177.1	51	65.9	42	33.1
FOODSKIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	-0.0	0	200.0
CLOTHING	0	13	23	36	12	0.0	10	84.1	13	56.9
LUMBER	28	29	30	32	0	3.2	1	5.2	1	5.3
PRINTING	0	1	1	2	0	0.0	0	120.0	0	54.5
CHEMICALS	0	1	1	2	0	0.0	0	100.0	0	75.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	35	73	99	35	0.0	37	107.7	26	35.9
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	3	5	7	9	1	63.3	2	42.9	2	31.4
WHOLESALE	66	71	82	90	10	17.5	11	16.6	8	10.0
FINANCE	0	2	3	7	1	0.0	1	112.5	3	97.1
SERVICES	9	16	23	37	6	73.3	7	46.6	13	60.3
GOVERNMENT	220	248	278	318	27	12.5	30	12.4	39	14.1
NON-MAN. TOT	294	347	407	481	53	18.1	59	17.1	74	18.4

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 38										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MORGAN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
WOLFE COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 39										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0
MORGAN COUNTY										
TOTAL NON-AG.	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
CONTRACT CONST	0	0	0	0	0	0.0	0	0.0	0	0.0
MANUF. TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
FOOD&KIND.	0	0	0	0	0	0.0	0	0.0	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	0	0	0	0	0.0	0	0.0	0	0.0
LUMBER	0	0	0	0	0	0.0	0	0.0	0	0.0
PRINTING	0	0	0	0	0	0.0	0	0.0	0	0.0
CHEMICALS	0	0	0	0	0	0.0	0	0.0	0	0.0
STONE	0	0	0	0	0	0.0	0	0.0	0	0.0
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	0	0	0	0	0.0	0	0.0	0	0.0
OTHER MANUF.	0	0	0	0	0	0.0	0	0.0	0	0.0
TRANSPORTATION	0	0	0	0	0	0.0	0	0.0	0	0.0
WHOLESALE	0	0	0	0	0	0.0	0	0.0	0	0.0
FINANCE	0	0	0	0	0	0.0	0	0.0	0	0.0
SERVICES	0	0	0	0	0	0.0	0	0.0	0	0.0
GOVERNMENT	0	0	0	0	0	0.0	0	0.0	0	0.0
NON-MAN. TOT	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 40										
TOTAL NON-AG.	1026	1385	1724	2275	358	35.0	339	24.5	550	31.9
MINING	102	196	284	449	93	92.0	87	44.8	165	58.3
CONTRACT CONST	13	32	50	79	18	146.2	17	55.6	29	59.0
MANUF. TOTAL	37	77	117	153	39	107.0	40	53.0	36	30.7
FOOD&KIND.	0	1	1	1	0	0.0	0	37.5	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	12	31	41	11	0.0	18	158.0	10	34.5
LUMBER	37	37	36	33	0	1.1	0	0.5	-4	-13.3
PRINTING	0	1	1	2	0	0.0	0	100.0	1	120.0
CHEMICALS	0	2	5	10	2	0.0	2	104.0	4	86.3
STONE	0	1	2	4	1	0.0	1	118.2	1	62.5
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	22	39	62	22	0.0	16	76.2	23	58.5
OTHER MANUF.	0	0	0	0	0	0.0	0	100.0	0	100.0
TRANSPORTATION	72	102	129	168	29	41.0	27	27.3	38	30.1
WHOLESALE	176	217	255	289	40	23.2	38	17.7	34	13.5
FINANCE	16	22	26	41	6	39.4	5	26.5	13	47.2
SERVICES	45	95	142	255	50	111.3	47	49.4	112	79.2
GOVERNMENT	565	644	719	840	79	14.1	74	11.6	120	16.8
NON-MAN. TOT	989	1308	1607	2122	319	32.3	299	22.9	514	32.0
MAGOFFIN COUNTY										
TOTAL NON-AG.	1026	1385	1724	2275	358	35.0	339	24.5	550	31.9
MINING	102	196	284	449	93	92.0	87	44.8	165	58.3
CONTRACT CONST	13	32	50	79	18	146.2	17	55.6	29	59.0
MANUF. TOTAL	37	77	117	153	39	107.0	40	53.0	36	30.7
FOOD&KIND.	0	1	1	1	0	0.0	0	37.5	0	0.0
TOBACCO	0	0	0	0	0	0.0	0	0.0	0	0.0
CLOTHING	0	12	31	41	11	0.0	18	158.0	10	34.5
LUMBER	37	37	36	33	0	1.1	0	0.5	-4	-13.3
PRINTING	0	1	1	2	0	0.0	0	100.0	1	120.0
CHEMICALS	0	2	5	10	2	0.0	2	104.0	4	86.3
STONE	0	1	2	4	1	0.0	1	118.2	1	62.5
PRIMARY MET.	0	0	0	0	0	0.0	0	0.0	0	0.0
MACHINERY	0	22	39	62	22	0.0	16	76.2	23	58.5
OTHER MANUF.	0	0	0	0	0	0.0	0	100.0	0	100.0
TRANSPORTATION	72	102	129	168	29	41.0	27	27.3	38	30.1
WHOLESALE	176	217	255	289	40	23.2	38	17.7	34	13.5
FINANCE	16	22	26	41	6	39.4	5	26.5	13	47.2
SERVICES	45	95	142	255	50	111.3	47	49.4	112	79.2
GOVERNMENT	565	644	719	840	79	14.1	74	11.6	120	16.8
NON-MAN. TOT	989	1308	1607	2122	319	32.3	299	22.9	514	32.0

SEGMENT BREAKDOWN	EMPLOYMENT "AT-YEAR"				EMPLOYMENT NUMBER AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL NON-AG.	57343	71084	85018	108971	13741	24.0	14533	20.4	23353	27.3
MINING	531	671	813	1087	139	26.3	141	21.1	274	33.7
CONTRACT CONST	2116	2499	2920	3669	382	18.1	421	16.9	749	25.7
MANUF. TOTAL	14928	19560	24581	30185	4632	31.0	5020	25.7	5603	22.8
FOOD&KIND.	763	744	664	584	-19	-2.5	-80	-10.8	-79	-12.0
TOBACCO	100	188	265	360	87	88.3	76	41.0	95	36.0
CLOTHING	3812	4658	5389	6481	846	22.2	730	15.7	1091	20.3
LUMBER	1056	1234	1467	1835	177	16.8	232	18.8	367	25.1
PRINTING	884	1260	1622	2272	375	42.5	362	28.8	649	40.1
CHEMICALS	570	840	1170	1549	269	47.2	329	39.3	379	32.4
STONE	301	374	466	736	73	24.4	91	24.4	270	58.0
PRIMARY MET.	674	961	1043	1203	87	10.0	81	8.5	159	15.3
MACHINERY	6169	8790	11844	14250	2621	42.5	3054	34.7	2405	20.3
OTHER MANUF.	398	511	652	916	112	28.4	140	27.5	264	40.6
TRANSPORTATION	4166	4413	4652	5032	226	5.4	238	5.4	379	8.2
WHOLESALE	12609	14957	17380	19921	2348	18.6	2422	16.2	2540	14.6
FINANCE	1824	2194	2575	3526	369	20.3	381	17.4	951	37.0
SERVICES	7121	9469	11894	18513	2347	33.2	2404	25.3	6618	55.7
GOVERNMENT	14027	17301	20604	27040	3274	23.3	3503	20.2	6235	30.0
NON-MAN. TOT	42415	51524	61037	78787	9108	21.5	9513	18.5	17750	29.1

Appendix A-5

ADD EMPLOYMENT DISAGGREGATION

ADD EMPLOYMENT DISAGGREGATION

The tables in this Appendix represent ADD level summaries of employment information. Data for these tables were derived from the same sources and resulted from the same calculations as used to generate the information/data of Appendix A-4.

Exhibit A-5t - ADD Employment Trends and Projections, 1970-1995, For the Licking River Basin

Fivco ADD

Area of Coverage in Basin	At Year Actual or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1970-70	1980-75	1995-80	1975-70	1980-75	1995-80
Total Non-Agric.	0	0	0	0	0	0	0	0.0	0.0	0.0
Mining	0	0	0	0	0	0	0	0.0	0.0	0.0
Contract Const.	0	0	0	0	0	0	0	0.0	0.0	0.0
Manuf. Total	0	0	0	0	0	0	0	0.0	0.0	0.0
Food & Kind.	0	0	0	0	0	0	0	0.0	0.0	0.0
Tobacco	0	0	0	0	0	0	0	0.0	0.0	0.0
Clothing	0	0	0	0	0	0	0	0.0	0.0	0.0
Lumber	0	0	0	0	0	0	0	0.0	0.0	0.0
Printing	0	0	0	0	0	0	0	0.0	0.0	0.0
Chemicals	0	0	0	0	0	0	0	0.0	0.0	0.0
Stone	0	0	0	0	0	0	0	0.0	0.0	0.0
Primary Metals	0	0	0	0	0	0	0	0.0	0.0	0.0
Machinery	0	0	0	0	0	0	0	0.0	0.0	0.0
Other Manuf.	0	0	0	0	0	0	0	0.0	0.0	0.0
Transportation	0	0	0	0	0	0	0	0.0	0.0	0.0
Wholesale	0	0	0	0	0	0	0	0.0	0.0	0.0
Finance	0	0	0	0	0	0	0	0.0	0.0	0.0
Services	0	0	0	0	0	0	0	0.0	0.0	0.0
Government	0	0	0	0	0	0	0	0.0	0.0	0.0
Non Man. Total	0	0	0	0	0	0	0	0.0	0.0	0.0
Big Sandy Add										
Total Non-Agric.	1,025	1,384	1,724	2,274	359	340	550	35.0	24.6	31.9
Mining	102	195	283	448	93	88	165	91.2	45.1	58.3
Contract Const.	13	31	49	79	18	18	30	138.5	58.1	61.2
Manuf. Total	36	76	117	153	40	41	36	181.1	53.9	30.7
Food & Kind.	0	0	1	1	0	1	1	0.0	0.0	0.0
Tobacco	0	0	0	0	0	0	0	0.0	0.9	0.0
Clothing	0	11	30	41	11	19	11	0.0	172.7	36.7
Lumber	36	37	37	32	1	0	-5	0.0	0.0	-13.5
Printing	0	0	1	2	0	1	1	0.0	0.0	100.0
Chemicals	0	2	5	9	2	3	4	0.0	150.0	80.0
Stone	0	1	2	3	1	1	1	0.0	50.0	33.3
Primary Metals.	0	0	0	0	0	0	0	0.0	0.0	0.0
Machinery	0	22	39	62	22	17	23	0.0	77.3	59.0
Other Manuf.	0	0	0	0	0	0	0	0.0	0.0	0.0
Transportation	71	101	129	168	30	28	39	42.2	27.7	30.2
Wholesale	176	216	255	289	40	39	34	250.0	18.0	13.3
Finance	16	22	28	41	6	6	13	37.5	27.3	46.4
Services	44	95	142	254	51	47	112	15.9	49.5	78.9
Government	564	644	719	830	80	75	120	14.2	11.6	16.7
Non Man. Total	988	1,307	1,607	2,121	319	300	514	32.3	23.0	32.0
Gateway Add										
Total Non-Agricul	11,880	15,806	20,518	27,303	3,926	4,712	6,785	33.0	29.8	33.1
Mining	102	127	161	228	25	34	67	24.5	26.8	39.8
Contract Const.	482	654	869	1,250	172	215	596	35.7	32.9	68.6
Manuf. Total	3,778	5,656	7,819	10,265	1,878	2,163	2,446	49.7	38.2	31.3
Food & Kind.	86	85	79	55	-1	-6	-25	-1.2	-7.0	-30.4
Tobacco	35	36	39	48	1	3	9	2.8	8.3	23.1
Clothing	1,183	1,666	2,120	2,889	483	454	769	40.8	27.2	36.3
Lumber	367	4-2	465	559	35	65	94	9.5	15.7	20.2
Printing	70	88	114	148	18	26	34	25.7	29.5	29.8
Chemicals	50	70	100	151	20	30	51	40.0	42.8	33.8
Stone	141	114	89	83	-27	-25	-6	-19.1	-21.9	06.7
Primary Metals	0	0	0	0	0	0	0	0.0	0.0	0.0
Machinery	1,839	3,179	4,800	6,317	1,340	1,621	1,517	72.9	51.0	31.6
Other Manuf.	0	0	0	0	0	0	0	0.0	0.0	0.0
Transportation	499	570	660	692	71	90	32	14.2	15.8	4.8
Wholesale	2,058	2,461	2,962	3,444	403	501	482	19.6	20.3	16.3
Finance	246	308	385	575	62	77	190	25.2	25.0	49.3
Services	802	1,036	1,368	2,173	234	332	805	29.2	32.0	58.8
Government	3,900	4,959	6,277	8,562	1,059	1,318	2,285	27.2	26.6	36.4
Non-Manf. Total	8,101	10,147	12,696	17,035	2,549	2,549	9,339	25.2	25.1	34.2

Exhibit A-5t - ADD Employment Trends and Projections, 1970 - 1995, For the Licking River Basin

Kentucky River ADD

Area of Coverage in Basin	At Year or Proposed Employment				Between Year Changes			Between Year Percent Changes		
	1970	1975	1980	1995	1975-70	1980-75	1995-80	1975-70	1980-75	1995-80
Total Non Agric.	0	0	0	0	0	0	0	0.0	0.0	0.0
Mining	0	0	0	0	0	0	0	0.0	0.0	0.0
Contract Const.	0	0	0	0	0	0	0	0.0	0.0	0.0
Manuf. Total	0	0	0	0	0	0	0	0.0	0.0	0.0
Food & Kind.	0	0	0	0	0	0	0	0.0	0.0	0.0
Tobacco	0	0	0	0	0	0	0	0.0	0.0	0.0
Clothing	0	0	0	0	0	0	0	0.0	0.0	0.0
Lumber	0	0	0	0	0	0	0	0.0	0.0	0.0
Printing	0	0	0	0	0	0	0	0.0	0.0	0.0
Chemicals	0	0	0	0	0	0	0	0.0	0.0	0.0
Stone	0	0	0	0	0	0	0	0.0	0.0	0.0
Primary Metals	0	0	0	0	0	0	0	0.0	0.0	0.0
Machinery	0	0	0	0	0	0	0	0.0	0.0	0.0
Other Manuf.	0	0	0	0	0	0	0	0.0	0.0	0.0
Transportation	0	0	0	0	0	0	0	0.0	0.0	0.0
Wholesale	0	0	0	0	0	0	0	0.0	0.0	0.0
Finance	0	0	0	0	0	0	0	0.0	0.0	0.0
Services	0	0	0	0	0	0	0	0.0	0.0	0.0
Government	0	0	0	0	0	0	0	0.0	0.0	0.0
Non Man. Total	0	0	0	0	0	0	0	0.0	0.0	0.0
Northern Kentucky ADD										
Total Non Agric.	27,323	32,750	38,357	48,197	5,427	5,607	9,840	19.9	17.1	25.7
Mining	181	191	200	219	10	9	19	5.5	4.7	9.5
Contract Const.	1,058	1,116	1,176	1,285	58	60	109	5.5	5.4	9.3
Manuf. Total	5,023	6,247	7,674	9,180	1,224	1,427	1,506	24.4	22.8	19.6
Food & Kind.	463	407	335	307	-56	-42	-28	-12.1	-17.7	-8.4
Tobacco	8	33	61	112	25	28	51	312.5	84.8	83.6
Clothing	232	218	166	137	-14	-52	-29	06.0	-23.8	-17.5
Lumber	325	456	616	858	131	160	242	40.3	35.1	39.3
Printing	723	898	1,074	1,484	125	176	410	24.2	19.6	38.2
Chemicals	276	433	624	857	157	191	233	56.9	44.1	37.3
Stone	136	189	256	355	53	67	99	39.0	35.4	38.7
Primary Metals	363	393	430	565	30	37	135	8.3	9.4	31.4
Machinery	2,249	3,004	3,864	4,196	755	860	332	33.6	28.6	8.6
Other Manuf.	197	211	225	289	14	14	64	7.1	6.6	28.4
Transportation	2,537	2,537	2,537	2,537	0	0	0	0.0	0.0	0.0
Wholesale	7,202	8,441	9,670	10,785	1,239	1,229	1,115	17.2	14.5	11.5
Finance	1,021	1,174	1,325	1,711	153	151	386	15.0	12.9	22.6
Services	4,549	5,951	7,346	11,333	1,402	1,395	3,987	30.8	23.4	54.3
Government	5,732	7,074	8,412	10,858	1,342	1,330	2,446	23.4	18.9	29.1
Non Man. Total	22,296	26,501	30,680	39,015	4,206	4,179	8,335	18.8	15.8	27.2
Buffalo Trace ADD										
Total Non Agric.	2,881	3,401	3,870	4,679	520	469	809	18.0	13.7	20.9
Mining	75	77	78	83	2	1	5	2.7	1.3	6.4
Contract Const.	74	74	74	74	0	0	0	0.0	0.0	0.0
Manuf. Total	929	1,455	1,546	1,921	526	91	375	56.6	6.2	24.2
Food & Kind.	26	36	35	33	10	-1	-2	38.5	-2.8	-5.7
Tobacco	8	20	34	38	12	14	4	150.0	70.0	11.8
Clothing	507	719	883	1,045	212	164	162	41.8	22.8	18.3
Lumber	15	18	19	26	3	1	5	20.0	5.6	26.3
Printing	5	6	6	7	1	0	1	20.0	0.0	16.7
Chemicals	75	104	151	190	29	47	39	38.7	45.2	25.8
Stone	2	2	4	4	0	2	0	0.0	100.0	0.0
Primary Metals	0	0	0	0	0	0	0	0.0	0.0	0.0
Machinery	286	343	401	564	57	58	163	19.9	16.9	40.6
Other Manuf.	0	0	0	0	0	0	0	0.0	0.0	0.0
Transportation	213	198	184	184	-45	-14	0	-21.1	7.1	0.0
Wholesale	513	553	590	628	35	37	38	6.8	6.7	6.4
Finance	73	80	86	104	7	6	18	9.6	7.5	20.9
Services	168	241	315	529	73	74	214	43.4	30.7	67.9
Givernment	817	899	981	1,143	82	82	162	10.0	9.1	16.5
Non-Man. Total	1,950	2,135	2,321	2,756	185	186	435	9.5	8.7	18.7

Exhibit A-5t - ADD Employment Trends and Projections, 1970 - 1995, For the Licking River Basin.

Bluegrass ADD

Area of Coverage in Basin	At Year or Proposed Employment				Between Year Change			Between Yr. Percent Changes		
	1970	1975	1980	1995	1975-70	1980-75	1995-80	1975-70	1980-75	1995-80
Total Non Agric.	14,224	17,733	21,140	26,508	3,509	3,407	5,368	24.7	19.2	25.4
Mining	64	73	81	99	9	8	18	14.1	11.0	22.2
Contract Const.	484	614	741	971	130	127	230	26.9	20.7	31.0
Manuf. Total	5,152	6,307	7,415	8,653	1,155	1,108	1,238	22.4	17.6	16.7
Food & Kind	187	208	204	180	21	-4	- 24	11.2	-1.9	-11.8
Tobacco	43	92	121	153	49	29	32	114.0	31.5	26.4
Clothing	1,849	2,035	2,180	2,360	186	145	180	10.1	7.1	8.3
Lumber	307	312	319	350	5	7	31	1.6	2.2	9.7
Printing	77	273	419	623	196	146	204	254.5	53.5	48.7
Chemicals	164	221	283	333	57	62	50	34.8	28.1	17.7
Stone	50	93	140	315	43	47	175	86.0	50.5	125.0
Primary Metals	510	562	609	635	52	47	26	10.2	8.4	4.3
Machinery	1,790	2,232	2,731	3,102	442	499	371	24.7	22.4	13.6
Other Manuf.	198	297	422	622	99	125	200	50.0	42.1	47.4
Transportation	857	997	1,133	1,342	140	136	209	16.3	13.6	18.4
Wholesale	2,646	3,277	3,894	4,496	631	617	602	23.8	18.8	15.5
Finance	458	601	742	1,087	143	141	345	31.2	23.5	46.5
Services	548	2,138	2,713	4,214	590	575	1,501	38.1	26.9	55.3
Government	3,004	3,714	4,406	5,628	710	692	1,222	23.6	18.6	27.7
Non Man. Total	9,070	11,423	13,723	17,849	2,353	12,300	4,126	25.9	7.7	30.1

Appendix A-6

LAND USE DISAGGREGATION

The ADAPT system provides a method for the storage, manipulation and retrieval of spatially distributed land use data at a level of disaggregation commensurate with the specific needs of the planning effort. This capability permits the planner not only to select a level of disaggregation of land use data commensurate with current water quality management planning needs and existing land use information, but also provides a framework for later disaggregation and/or refinement of portions or the entirety of the land use data base as additional information is developed.

The categories of existing land use selected for disaggregation and documentation for this 303(e) Planning cycle are described in Chapter III and consist of the following:

- Urban.
- Rural.
  - agriculture
  - silviculture
  - mining
  - water surface (as a subcategory of rural land use)

These land use categories were selected commensurate with current 303(e) Planning requirements, the availability of information, and the availability of ADAPT.

The framework within which the land use disaggregation process was conducted was as follows:

- The triangle map of the Basin was developed at a level of disaggregation such that each triangle was homogeneous and codified with respect to each:
  - existing (sewerage system) service area (ESA), as defined from information contained in the ADD Water and Sewer Plans.
  - Intensive and Outer 201 Planning Areas, as defined by the State Department for Natural Resources and Environmental Protection (DNR&EP), Division of Water Quality.
  - soil association.
  - enumeration district, city, county, and ADD boundaries.
  - drainage basin boundaries.
- Those triangular areas predominantly or totally comprised of water surfaces were classified in a "water" subcategory.
- Areas in which the existing land use was classified as predominantly or totally urban in the ADD land use and water and sewer planning documents were identified, and transferred to the triangle map; all triangular areas containing greater than 50 percent residential, commercial and/or industrial land use were classified as "1970 existing urban."
- 1975 and 1980 urban land areas were assumed to be identical in extent, and "1975 - 1980 urban" land use was defined as the summation of triangular areas designated as "1970 existing urban" and the remaining areas of each ESA nad/or urban Enumeration Districts not included as "1970 existing urban" land use.
- "1995 urban" land was defined as the aggregation of triangular areas designated as "1975-1980 urban" land use and the remaining areas of each Intensive 201 Planning Area not included as "1975 - 1980 urban" land use.
- The location and extent of strip mined lands were defined using maps produced from satellite imagery at a scale of 1: 250,000, as provided by the DNR&EP, Office of Planning and Research; with pantography, templates at a scale of 1: 24,000 (corresponding to the scale of the ADAPT triangular grid maps) were produced showing the length of contour/bench strip mined lands and the areal extent of area strip mined lands.
- From the templates, the length of contour/bench strip mined lands in each triangle was measured and the areas of these benches estimated by assuming a bench width of 300 feet; the areal extent of area strip mined lands in each triangle was determined by planimetry, and the total area of strip mined land in each triangle was taken as the sum of the areas of land disturbed by both forms of strip mining.
- The location and areal extent of cleared area was determined using the 7 1/2 minute map series of the U. S. Geological Survey; the areal extent of cleared area in each triangle was determined by planimetry.

Developed from the preceding process were the following sets of information:

- A listing of all triangles designed as water surfaces.
- A listing of triangles classified as "1970 existing urban," "1975 - 1980 urban," and "1995 urban," disaggregated by ESA nad/or Intensive 201 Planning Area, and the area of each triangle.
- A listing of triangles containing strip mined land and the area of strip mined land in each triangle.
- A listing of triangles containing cleared land, and the area of cleared land in each triangle.

With the preceding information base, the land use disaggregation process was completed as follows:

- The entirety of the area of any triangle encompassing a water surface was classified as the "water" subcategory of rural land use.
- The entirety of the area of any triangle designated as urban for a specified time horizon (1970, 1975 - 1980, and/or 1995) was classified as "urban" land use as of the specified time horizon.
- In each triangle not designated as "urban" at a specified time horizon, or as "water" (the latter independent of time horizon),
  - the area of each triangle defined as mining was assigned the "mining" land use subcategory.
  - the difference between the total area of each triangle and the greater of "cleared" or "mined" areas in the triangle was assigned the "silviculture" land use subcategory.
  - the area of each triangle not classified as "mining" or "silviculture" was assigned the "agriculture" land use subcategory.
- With the preceding assignment of the entire areas

of triangles as "urban" at a specified time horizon, or as "water" independent of time horizon, and the assignment of areas within each triangle as "mining,""silviculture," or "agriculture," it was then possible, using a subroutine in ADAPT, to summarize for each specified time horizon, the total land area assigned to the urban and rural land use categories, and to the mining, silviculture, agriculture, and water subcategories within the rural land use categories, and to the mining, silviculture, agriculture, and water subcategories within the rural land use category, by county, segment, basin, or other desired level of aggregation.

The land use disaggregation data for the Licking River Basin is presented in Exhibit A-6t. The area (in units of square miles) assigned to each land use category is presented at three levels of aggregation. The total area for each land use category is presented for each segment, for each county within each segment, and for the entire Basin. The area for each category at each level of aggregation is presented for the years 1970 (existing), 1975, 1980, and 1995. Between year changes in the area for each land use category are presented at the same levels of aggregation for the period of 1970 to 1975, 1975 to 1980, and 1980 to 1995, as is the percent change in the area of each land use category.

Exhibit A-6t - Segment Land Use Trends and Projections, "At Year"and "Between Year" Change

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
U. U.										
LICKING RIVER BASIN										
TOTAL										
URBAN										
RURAL										
AGRIC										
SILVIC										
MINING										
WATER										
SEGMENT NUMBER 1										
TOTAL	5	5	5	5	0	0.0	0	0.0	0	0.0
URBAN	5	5	5	5	0	0.0	0	0.0	0	0.0
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
AGRIC	0	0	0	0	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL	2	2	2	2	0	0.0	0	0.0	0	0.0
URBAN	2	2	2	2	0	0.0	0	0.0	0	0.0
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
AGRIC	0	0	0	0	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	3	3	3	3	0	0.0	0	0.0	0	0.0
URBAN	3	3	3	3	0	0.0	0	0.0	0	0.0
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
AGRIC	0	0	0	0	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-00		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 2										
TOTAL	103	103	103	103	0	0.0	0	0.0	0	0.0
URBAN	17	17	17	18	0	0.0	0	0.0	1	5.9
RURAL	86	86	86	85	0	0.0	0	0.0	-1	1.2
AGRIC	60	60	60	59	0	0.0	0	0.0	-1	1.7
SILVIC	26	26	26	26	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL	40	40	40	40	0	0.0	0	0.0	0	0.0
URBAN	8	8	8	8	0	0.0	0	0.0	0	0.0
RURAL	32	32	32	32	0	0.0	0	0.0	0	0.0
AGRIC	24	22	22	22	-2	-8.3	0	0.0	0	0.0
SILVIC	8	8	8	8	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	16	16	16	16	0	0.0	0	0.0	0	0.0
URBAN	9	9	9	9	0	0.0	0	0.0	0	0.0
RURAL	9	9	9	9	0	0.0	0	0.0	0	0.0
AGRIC	5	5	5	5	0	0.0	0	0.0	0	0.0
SILVIC	4	4	4	4	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	45	45	45	45	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	1	-
RURAL	45	45	45	44	0	0.0	0	0.0	0	-2.2
AGRIC	32	32	32	31	0	0.0	0	0.0	0	-2.3
SILVIC	13	13	13	13	0	0.0	0	0.0	0	-2.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 3										
TOTAL	58	58	58	58	0	0.0	0	0.0	0	0.0
URBAN	15	31	31	31	16	10.67	0	0.0	0	0.0
RURAL	43	27	27	27	-16	-37.2	0	0.0	0	0.0
AGRIC	29	21	21	21	-8	-27.6	0	0.0	0	0.0
SILVIC	14	6	6	6	-8	-58.6	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOONE COUNTY										
TOTAL	5	5	5	5	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	4	4	4	4	0	0.0	0	0.0	0	0.0
AGRIC	4	4	4	4	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	53	53	53	53	0	0.0	0	0.0	0	0.0
URBAN	14	30	30	30	16	106.7	0	0.0	0	0.0
RURAL	39	23	23	23	-16	-37.2	0	0.0	0	0.0
AGRIC	25	17	17	17	-8	-27.6	0	0.0	0	0.0
SILVIC	14	6	6	6	-8	-59.2	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 4										
TOTAL	9	9	9	9	0	0.0	0	0.0	0	0.0
URBAN	3	4	4	4	1	33.3	0	0.0	0	0.0
RURAL	6	5	5	5	-1	-16.7	0	0.0	0	0.0
AGRIC	4	3	3	3	-1	-25.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	-0.7	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	9	9	9	9	0	0.0	0	0.0	0	0.0
URBAN	3	4	4	4	1	33.3	0	0.0	0	0.0
RURAL	6	5	5	5	-1	-16.7	0	0.0	0	0.0
AGRIC	4	3	3	3	-1	-25.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	-0.7	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "TIMELINE-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 5										
TOTAL	4	4	4	4	0	0.0	0	0.0	0	0.0
URBAN	1	2	2	2	1	100.0	0	0.0	0	0.0
RURAL	3	2	2	2	-1	-33.3	0	0.0	0	0.0
AGRIC	3	2	2	2	-1	-33.3	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL	4	4	4	4	0	0.0	0	0.0	0	0.0
URBAN	1	2	2	2	1	100.0	0	0.0	0	0.0
RURAL	3	2	2	2	-1	-33.3	0	0.0	0	0.0
AGRIC	3	2	2	2	-1	-33.3	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "TIMELINE-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 6										
TOTAL	13	13	13	13	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	13	13	13	13	0	0.0	0	0.0	0	0.0
AGRIC	8	8	8	8	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	13	13	13	13	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	13	13	13	13	0	0.0	0	0.0	0	0.0
AGRIC	8	8	8	8	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 7										
TOTAL	33	33	33	33	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	6	0	0.0	0	0.0	5	
RURAL	32	32	32	27	0	0.0	0	0.0	-5	-18.2
AGRIC	23	23	23	18	0	0.0	0	0.0	-5	-22.3
SILVIC	9	9	9	8	0	0.0	0	0.0	0	-7.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOONE COUNTY										
TOTAL	1	1	1	1	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	0	313.9
RURAL	1	1	1	0	0	0.0	0	0.0	0	
AGRIC	1	1	1	0	0	0.0	0	0.0	0	
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	32	32	32	32	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	5	0	0.0	0	0.0	5	0.0
RURAL	32	32	32	27	0	0.0	0	0.0	-5	-16.4
AGRIC	23	23	23	18	0	0.0	0	0.0	-4	-19.9
SILVIC	9	9	9	8	0	0.0	0	0.0	0	-7.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 8										
TOTAL	18	18	18	18	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	17	17	17	17	0	0.0	0	0.0	0	0.0
AGRIC	12	12	12	12	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CAMPBELL COUNTY										
TOTAL	18	18	18	18	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	17	17	17	17	0	0.0	0	0.0	0	0.0
AGRIC	12	12	12	12	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 9										
TOTAL	121	121	121	121	0	0.0	0	0.0	0	0.0
URBAN	1	3	3	4	1	78.8	0	0.0	1	49.6
RURAL	120	118	118	117	-1	-1.0	0	0.0	-1	-1.1
AGRIC	88	86	86	85	-1	-1.3	0	0.0	-1	-1.4
SILVIC	32	32	32	32	0	0.0	0	0.0	0	-0.3
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
GRANT COUNTY										
TOTAL	42	42	42	42	0	0.0	0	0.0	0	0.0
URBAN	1	3	3	4	1	78.8	0	0.0	1	49.6
RURAL	41	40	40	38	-1	-2.8	0	0.0	-1	-3.2
AGRIC	33	32	32	31	-1	-3.4	0	0.0	-1	-3.7
SILVIC	7	7	7	7	0	0.0	0	0.0	0	-1.1
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
KENTON COUNTY										
TOTAL	15	15	15	15	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	15	15	15	15	0	0.0	0	0.0	0	0.0
AGRIC	11	11	11	11	0	0.0	0	0.0	0	0.0
SILVIC	3	3	3	3	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	64	64	64	64	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	64	64	64	64	0	0.0	0	0.0	0	0.0
AGRIC	43	43	43	43	0	0.0	0	0.0	0	0.0
SILVIC	21	21	21	21	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 10										
TOTAL	47	47	47	47	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	47	47	47	47	0	0.0	0	0.0	0	0.0
AGRIC	34	34	34	34	0	0.0	0	0.0	0	0.0
SILVIC	13	13	13	13	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BRACKEN COUNTY										
TOTAL	14	14	14	14	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	14	14	14	14	0	0.0	0	0.0	0	0.0
AGRIC	12	12	12	12	0	0.0	0	0.0	0	0.0
SILVIC	3	3	3	3	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	32	32	32	32	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	32	32	32	32	0	0.0	0	0.0	0	0.0
AGRIC	22	22	22	22	0	0.0	0	0.0	0	0.0
SILVIC	10	10	10	10	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 11										
TOTAL	187	187	187	187	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	3	0	76.6	0	0.0	1	110.1
RURAL	186	186	186	184	0	-0.3	0	0.0	-1	-0.8
AGRIC	144	143	143	142	0	-0.4	0	0.0	-1	-1.0
SILVIC	42	42	42	42	0	0.0	0	0.0	0	-0.1
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	142	142	142	142	0	0.0	0	0.0	0	0.0
URBAN	0	1	1	1	0	0.0	0	0.0	0	56.2
RURAL	142	141	141	141	0	-0.4	0	0.0	0	-0.2
AGRIC	112	111	111	111	0	-0.5	0	0.0	0	-0.3
SILVIC	30	30	30	30	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	45	45	45	45	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	2	0	0.0	0	0.0	1	157.2
RURAL	44	44	44	43	0	0.0	0	0.0	-1	-2.8
AGRIC	32	32	32	31	0	0.0	0	0.0	-1	-3.7
SILVIC	12	12	12	12	0	0.0	0	0.0	0	-0.3
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 12										
TOTAL	52	52	52	52	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	35.1	0	0.0	0	0.0
RURAL	51	51	51	51	0	-0.6	0	0.0	0	0.0
AGRIC	32	32	32	32	0	-0.8	0	0.0	0	0.0
SILVIC	19	19	19	19	0	-0.2	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
GRANT COUNTY										
TOTAL	34	34	34	34	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	35.1	0	0.0	0	0.0
RURAL	33	33	33	33	0	-0.9	0	0.0	0	0.0
AGRIC	19	19	19	19	0	-1.3	0	0.0	0	0.0
SILVIC	14	14	14	14	0	-0.3	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	18	18	18	18	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	18	18	18	18	0	0.0	0	0.0	0	0.0
AGRIC	13	13	13	13	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 13										
TOTAL	23	23	23	23	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	0	245.1
RURAL	23	23	23	23	0	0.0	0	0.0	0	-2.3
AGRIC	17	17	17	16	0	0.0	0	0.0	0	-2.8
SILVIC	6	6	6	6	0	0.0	0	0.0	0	-0.9
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
GRANT COUNTY										
TOTAL	12	12	12	12	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	0	245.1
RURAL	12	12	12	11	0	0.0	0	0.0	0	-4.4
AGRIC	9	9	9	8	0	0.0	0	0.0	0	-5.3
SILVIC	3	3	3	3	0	0.0	0	0.0	0	-2.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	5	5	5	5	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	5	5	5	5	0	0.0	0	0.0	0	0.0
AGRIC	3	3	3	3	0	0.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	6	6	6	6	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	6	6	6	6	0	0.0	0	0.0	0	0.0
AGRIC	5	5	5	5	0	0.0	0	0.0	0	0.0
SILVIC	1	1	1	1	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 14										
TOTAL	54	54	54	54	0	0.0	0	0.0	0	0.0
URBAN	4	4	4	8	0	17.0	0	0.0	3	86.3
RURAL	50	50	50	46	0	-1.2	0	0.0	-3	-7.3
AGRIC	45	45	45	41	0	-1.3	0	0.0	-3	-7.6
SILVIC	5	5	5	5	0	0.0	0	0.0	0	-4.7
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	54	54	54	54	0	0.0	0	0.0	0	0.0
URBAN	4	4	4	8	0	17.0	0	0.0	3	86.3
RURAL	50	50	50	46	0	-1.2	0	0.0	-3	-7.3
AGRIC	45	45	45	41	0	-1.3	0	0.0	-3	-7.6
SILVIC	5	5	5	5	0	0.0	0	0.0	0	-4.7
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 15										
TOTAL	65	65	65	65	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	1	230.0
RURAL	65	65	65	64	0	0.0	0	0.0	-1	-1.6
AGRIC	59	59	59	58	0	0.0	0	0.0	-1	-1.8
SILVIC	6	6	6	6	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MORRON COUNTY										
TOTAL	28	28	28	28	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	28	28	28	28	0	0.0	0	0.0	0	0.0
AGRIC	26	26	26	26	0	0.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	37	37	37	37	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	1	230.0
RURAL	37	37	37	36	0	0.0	0	0.0	-1	-2.6
AGRIC	33	33	33	32	0	0.0	0	0.0	-1	-3.1
SILVIC	4	4	4	4	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 16										
TOTAL	256	256	256	256	0	0.0	0	0.0	0	0.0
URBAN	3	6	6	20	2	71.4	0	0.0	14	253.6
RURAL	253	250	250	235	-2	-1.0	0	0.0	-14	-5.9
AGRIC	235	233	233	219	-2	-1.0	0	0.0	-14	-6.2
SILVIC	17	17	17	17	0	-0.4	0	0.0	0	-1.9
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL	17	17	17	17	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	16	16	16	16	0	0.0	0	0.0	0	0.0
AGRIC	15	15	15	15	0	0.0	0	0.0	0	0.0
SILVIC	1	1	1	1	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOURBON COUNTY										
TOTAL	80	80	80	80	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	30.0	0	0.0	0	0.0
RURAL	80	79	79	79	0	-0.1	0	0.0	0	0.0
AGRIC	77	76	76	76	0	-0.1	0	0.0	0	0.0
SILVIC	3	3	3	3	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CLARK COUNTY										
TOTAL	1	1	1	1	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1	1	1	1	0	0.0	0	0.0	0	0.0
AGRIC	1	1	1	1	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	0	0	0	0	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	0	0	0	0	0	0.0	0	0.0	0	0.0
AGRIC	0	0	0	0	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MONTGOMERY CO										
TOTAL	71	71	71	71	0	0.0	0	0.0	0	0.0
URBAN	1	2	2	16	1	262.1	0	0.0	13	573.3
RURAL	71	69	69	56	-1	-2.4	0	0.0	-13	-19.3
AGRIC	66	64	64	51	-1	-2.6	0	0.0	-13	-20.3
SILVIC	5	5	5	5	0	0.0	0	0.0	0	-5.5
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
NICHOLAS COUNTY										
TOTAL	86	86	86	86	0	0.0	0	0.0	0	0.0
URBAN	1	2	2	3	0	60.6	0	0.0	1	85.5
RURAL	85	85	85	83	0	-0.7	0	0.0	-1	-1.7
AGRIC	77	77	77	75	0	-0.7	0	0.0	-1	-1.8
SILVIC	8	8	8	8	0	-0.9	0	0.0	0	-0.7
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 17										
TOTAL	104	104	104	104	0	0.0	0	0.0	0	0.0
URBAN	5	7	7	9	1	34.4	0	0.0	2	44.1
RURAL	99	97	97	94	-1	-1.7	0	0.0	-2	-3.0
AGRIC	95	94	94	91	-1	-1.7	0	0.0	-2	-3.0
SILVIC	3	3	3	3	0	0.0	0	0.0	0	-0.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOURBON COUNTY										
TOTAL	104	104	104	104	0	0.0	0	0.0	0	0.0
URBAN	5	7	7	9	1	34.4	0	0.0	2	44.1
RURAL	99	97	97	94	-1	-1.7	0	0.0	-2	-3.0
AGRIC	95	94	94	91	-1	-1.7	0	0.0	-2	-3.0
SILVIC	3	3	3	3	0	0.0	0	0.0	0	-0.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 18										
TOTAL	90	90	90	90	0	0.0	0	0.0	0	0.0
URBAN	3	4	4	5	1	33.9	0	0.0	0	15.9
RURAL	87	86	86	86	-1	-1.2	0	0.0	0	-0.8
AGRIC	83	83	83	82	0	-1.1	0	0.0	0	-0.8
SILVIC	4	4	4	4	0	-4.1	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOURBON COUNTY										
TOTAL	42	42	42	42	0	0.0	0	0.0	0	0.0
URBAN	3	4	4	5	1	33.9	0	0.0	0	15.9
RURAL	39	38	38	37	-1	-2.7	0	0.0	0	-1.7
AGRIC	37	36	36	35	0	-2.4	0	0.0	0	-1.8
SILVIC	2	2	2	2	0	-7.8	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CLARK COUNTY										
TOTAL	47	47	47	47	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	47	47	47	47	0	0.0	0	0.0	0	0.0
AGRIC	45	45	45	45	0	0.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MONTGOMERY CO										
TOTAL	1	1	1	1	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1	1	1	1	0	0.0	0	0.0	0	0.0
AGRIC	1	1	1	1	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 19										
TOTAL	5	5	5	5	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	57.5	0	0.0	0	19.7
RURAL	4	4	4	4	0	-7.7	0	0.0	0	-4.5
AGRIC	4	4	4	4	0	-7.7	0	0.0	0	-4.5
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOURBON COUNTY										
TOTAL	5	5	5	5	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	57.5	0	0.0	0	19.7
RURAL	4	4	4	4	0	-7.7	0	0.0	0	-4.5
AGRIC	4	4	4	4	0	-7.7	0	0.0	0	-4.5
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 20										
TOTAL	82	82	82	82	0	0.0	0	0.0	0	0.0
URBAN	5	5	5	17	0	3.3	0	0.0	11	220.3
RURAL	76	76	76	64	0	-0.2	0	0.0	-11	-15.5
AGRIC	75	75	75	63	0	-0.2	0	0.0	-11	-15.5
SILVIC	1	1	1	1	0	0.0	0	0.0	0	-9.9
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BOURBON COUNTY										
TOTAL	30	30	30	30	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	30	30	30	30	0	0.0	0	0.0	0	0.0
AGRIC	29	29	29	29	0	0.0	0	0.0	0	0.0
SILVIC	1	1	1	1	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
CLARK COUNTY										
TOTAL	51	51	51	51	0	0.0	0	0.0	0	0.0
URBAN	5	5	5	17	0	3.7	0	0.0	11	247.2
RURAL	47	47	47	35	0	-0.4	0	0.0	-11	-25.3
AGRIC	46	46	46	35	0	-0.4	0	0.0	-11	-25.3
SILVIC	0	0	0	0	0	0.0	0	0.0	0	-34.5
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 21										
TOTAL	50	50	50	50	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	50	50	50	50	0	0.0	0	0.0	0	0.0
AGRIC	33	33	33	33	0	0.0	0	0.0	0	0.0
SILVIC	18	18	18	18	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BRACKEN COUNTY										
TOTAL	1	1	1	1	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1	1	1	1	0	0.0	0	0.0	0	0.0
AGRIC	1	1	1	1	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	15	15	15	15	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	15	15	15	15	0	0.0	0	0.0	0	0.0
AGRIC	11	11	11	11	0	0.0	0	0.0	0	0.0
SILVIC	4	4	4	4	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	34	34	34	34	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	34	34	34	34	0	0.0	0	0.0	0	0.0
AGRIC	20	20	20	20	0	0.0	0	0.0	0	0.0
SILVIC	14	14	14	14	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 22										
TOTAL	15	15	15	15	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	15	15	15	15	0	0.0	0	0.0	0	0.0
AGRIC	8	8	8	8	0	0.0	0	0.0	0	0.0
SILVIC	7	7	7	7	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
PENDLETON COUNTY										
TOTAL	15	15	15	15	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	15	15	15	15	0	0.0	0	0.0	0	0.0
AGRIC	8	8	8	8	0	0.0	0	0.0	0	0.0
SILVIC	7	7	7	7	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 23										
TOTAL	174	174	174	174	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	3	0	17.7	0	0.0	1	132.0
RURAL	173	172	172	170	0	-0.1	0	0.0	-1	-1.1
AGRIC	143	143	143	141	0	-0.2	0	0.0	-1	-1.3
SILVIC	29	29	29	29	0	0.0	0	0.0	0	-0.4
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BRACKEN COUNTY										
TOTAL	69	69	69	69	0	0.0	0	0.0	0	0.0
URBAN	0	1	1	2	0	30.2	0	0.0	1	332.6
RURAL	69	68	68	67	0	-0.2	0	0.0	-1	-2.5
AGRIC	53	53	53	51	0	-0.2	0	0.0	-1	-3.1
SILVIC	16	16	16	16	0	0.0	0	0.0	0	-0.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL	74	74	74	74	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	14.9	0	0.0	0	0.0
RURAL	73	73	73	73	0	-0.1	0	0.0	0	0.0
AGRIC	67	67	67	67	0	-0.2	0	0.0	0	0.0
SILVIC	6	6	6	6	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
ROBERTSON CO										
TOTAL	31	31	31	31	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	120.6
RURAL	31	31	31	31	0	0.0	0	0.0	0	-0.7
AGRIC	24	24	24	24	0	0.0	0	0.0	0	-0.9
SILVIC	7	7	7	7	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 24										
TOTAL	10	10	10	10	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	10	10	10	10	0	0.0	0	0.0	0	0.0
AGRIC	9	9	9	9	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL	10	10	10	10	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	10	10	10	10	0	0.0	0	0.0	0	0.0
AGRIC	9	9	9	9	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 25										
TOTAL	22	22	22	22	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	22	22	22	22	0	0.0	0	0.0	0	0.0
AGRIC	21	21	21	21	0	0.0	0	0.0	0	0.0
SILVIC	1	1	1	1	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL	8	8	8	8	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	8	8	8	8	0	0.0	0	0.0	0	0.0
AGRIC	8	8	8	8	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL	14	14	14	14	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	14	14	14	14	0	0.0	0	0.0	0	0.0
AGRIC	14	14	14	14	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 26										
TOTAL	87	87	87	87	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	87	87	87	87	0	0.0	0	0.0	0	0.0
AGRIC	70	70	70	70	0	0.0	0	0.0	0	0.0
SILVIC	17	17	17	17	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL	20	20	20	20	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	20	20	20	20	0	0.0	0	0.0	0	0.0
AGRIC	16	16	16	16	0	0.0	0	0.0	0	0.0
SILVIC	4	4	4	4	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
LEWIS COUNTY										
TOTAL	32	32	32	32	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	32	32	32	32	0	0.0	0	0.0	0	0.0
AGRIC	22	22	22	22	0	0.0	0	0.0	0	0.0
SILVIC	10	10	10	10	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL	35	35	35	35	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	35	35	35	35	0	0.0	0	0.0	0	0.0
AGRIC	32	32	32	32	0	0.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 27										
TOTAL	8	8	8	8	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	8	8	8	8	0	0.0	0	0.0	0	0.0
AGRIC	7	7	7	7	0	0.0	0	0.0	0	0.0
SILVIC	1	1	1	1	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL	8	8	8	8	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	8	8	8	8	0	0.0	0	0.0	0	0.0
AGRIC	7	7	7	7	0	0.0	0	0.0	0	0.0
SILVIC	1	1	1	1	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 28										
TOTAL	393	393	393	393	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	9	0	67.5	0	0.0	8	930.6
RURAL	393	392	392	384	0	-0.1	0	0.0	-8	-2.1
AGRIC	302	302	302	296	0	-0.1	0	0.0	-5	-1.9
SILVIC	91	91	91	88	0	0.0	0	0.0	-2	-2.8
MINING	0	0	0	0	0	0.0	0	0.0	0	*****
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL	46	46	46	46	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	8	0	0.0	0	0.0	8	0.0
RURAL	46	46	46	38	0	0.0	0	0.0	-8	-17.6
AGRIC	32	32	32	27	0	0.0	0	0.0	-5	-17.1
SILVIC	14	14	14	11	0	0.0	0	0.0	-2	-18.5
MINING	0	0	0	0	0	0.0	0	0.0	0	*****
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BRACKEN COUNTY										
TOTAL	1	1	1	1	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1	1	1	1	0	0.0	0	0.0	0	0.0
AGRIC	1	1	1	1	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL	80	80	80	80	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	79	79	79	79	0	0.0	0	0.0	0	0.0
AGRIC	68	68	68	68	0	0.0	0	0.0	0	0.0
SILVIC	11	11	11	11	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
HARRISON COUNTY										
TOTAL	59	59	59	59	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	59	59	59	59	0	0.0	0	0.0	0	0.0
AGRIC	45	45	45	45	0	0.0	0	0.0	0	0.0
SILVIC	13	13	13	13	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MASON COUNTY										
TOTAL	19	19	19	19	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	64.7	0	0.0	0	0.0
RURAL	19	19	19	19	0	-0.1	0	0.0	0	0.0
AGRIC	18	18	18	18	0	-0.1	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
NICHOLAS COUNTY										
TOTAL	107	107	107	107	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	107	107	107	107	0	0.0	0	0.0	0	0.0
AGRIC	79	79	79	79	0	0.0	0	0.0	0	0.0
SILVIC	28	28	28	28	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
ROBERTSON CO										
TOTAL	68	68	68	68	0	0.0	0	0.0	0	0.0
URBAN	0	1	1	1	0	146.9	0	0.0	0	21.5
RURAL	68	67	67	67	0	-0.5	0	0.0	0	-0.2
AGRIC	52	51	51	51	0	-0.7	0	0.0	0	-0.2
SILVIC	16	16	16	16	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
ROWAN COUNTY										
TOTAL	14	14	14	14	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	14	14	14	14	0	0.0	0	0.0	0	0.0
AGRIC	6	6	6	6	0	0.0	0	0.0	0	0.0
SILVIC	8	8	8	8	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 29										
TOTAL	98	98	98	98	0	0.0	0	0.0	0	0.0
URBAN	1	2	2	3	0	28.4	0	0.0	1	108.8
RURAL	97	97	97	95	0	-0.3	0	0.0	-1	-1.7
AGRIC	88	88	88	86	0	-0.4	0	0.0	-1	-1.9
SILVIC	9	9	9	9	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL	97	97	97	97	0	0.0	0	0.0	0	0.0
URBAN	1	2	2	3	0	28.4	0	0.0	1	108.8
RURAL	96	96	96	94	0	-0.3	0	0.0	-1	-1.7
AGRIC	87	87	87	85	0	-0.4	0	0.0	-1	-1.9
SILVIC	9	9	9	9	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
NICHOLAS COUNTY										
TOTAL	1	1	1	1	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	1	1	1	1	0	0.0	0	0.0	0	0.0
AGRIC	1	1	1	1	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 30										
TOTAL	33	33	33	33	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	33	33	33	33	0	0.0	0	0.0	0	0.0
AGRIC	27	27	27	27	0	0.0	0	0.0	0	0.0
SILVIC	6	6	6	6	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL	33	33	33	33	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	33	33	33	33	0	0.0	0	0.0	0	0.0
AGRIC	27	27	27	27	0	0.0	0	0.0	0	0.0
SILVIC	6	6	6	6	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 31										
TOTAL	118	118	118	118	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	117	117	117	117	0	0.0	0	0.0	0	0.0
AGRIC	46	46	46	46	0	0.0	0	0.0	0	0.0
SILVIC	71	71	71	71	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
FLEMING COUNTY										
TOTAL	118	118	118	118	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	1	0	0.0	0	0.0	0	0.0
RURAL	117	117	117	117	0	0.0	0	0.0	0	0.0
AGRIC	46	46	46	46	0	0.0	0	0.0	0	0.0
SILVIC	71	71	71	71	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 32										
TOTAL	230	230	230	230	0	0.0	0	0.0	0	0.0
URBAN	2	2	2	19	0	0.0	0	0.0	16	870.1
RURAL	228	228	228	211	0	0.0	0	0.0	-16	-7.4
AGRIC	145	145	145	129	0	0.0	0	0.0	-15	-10.9
SILVIC	83	83	83	82	0	0.0	0	0.0	-1	-1.4
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL	104	104	104	104	0	0.0	0	0.0	0	0.0
URBAN	2	2	2	4	0	0.0	0	0.0	2	105.3
RURAL	102	102	102	100	0	0.0	0	0.0	-2	-2.0
AGRIC	71	71	71	69	0	0.0	0	0.0	-1	-2.2
SILVIC	32	32	32	31	0	0.0	0	0.0	0	-1.6
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL	26	26	26	26	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	26	26	26	26	0	0.0	0	0.0	0	0.0
AGRIC	5	5	5	5	0	0.0	0	0.0	0	0.0
SILVIC	21	21	21	21	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MONTGOMERY CO										
TOTAL	99	99	99	99	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	15	0	0.0	0	0.0	14	0.0
RURAL	99	99	99	84	0	0.0	0	0.0	-14	-15.0
AGRIC	69	69	69	55	0	0.0	0	0.0	-14	-20.5
SILVIC	30	30	30	29	0	0.0	0	0.0	0	-2.3
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 33										
TOTAL	51	51	51	51	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	51	51	51	51	0	0.0	0	0.0	0	0.0
AGRIC	46	46	46	46	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL	48	48	48	48	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	48	48	48	48	0	0.0	0	0.0	0	0.0
AGRIC	44	44	44	44	0	0.0	0	0.0	0	0.0
SILVIC	5	5	5	5	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MONTGOMERY CO										
TOTAL	3	3	3	3	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	3	3	3	3	0	0.0	0	0.0	0	0.0
AGRIC	3	3	3	3	0	0.0	0	0.0	0	0.0
SILVIC	0	0	0	0	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 34										
TOTAL	56	56	56	56	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	3	0	0.0	0	0.0	1	135.0
RURAL	55	55	55	54	0	0.0	0	0.0	-1	-2.7
AGRIC	13	13	13	12	0	0.0	0	0.0	0	-6.8
SILVIC	42	42	42	41	0	0.0	0	0.0	0	-1.4
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL	43	43	43	43	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	3	0	0.0	0	0.0	1	135.0
RURAL	42	42	42	40	0	0.0	0	0.0	-1	-3.5
AGRIC	11	11	11	10	0	0.0	0	0.0	0	-8.0
SILVIC	31	31	31	30	0	0.0	0	0.0	0	-1.9
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL	13	13	13	13	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	13	13	13	13	0	0.0	0	0.0	0	0.0
AGRIC	2	2	2	2	0	0.0	0	0.0	0	0.0
SILVIC	11	11	11	11	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 35										
TOTAL	186	186	186	186	0	0.0	0	0.0	0	0.0
URBAN	6	6	6	27	0	2.6	0	0.0	21	339.2
RURAL	180	180	180	159	0	-0.1	0	0.0	-21	-11.7
AGRIC	46	46	46	37	0	-0.1	0	0.0	-8	-18.5
SILVIC	133	133	133	121	0	-0.1	0	0.0	-12	-9.4
MINING	1	1	1	1	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
ROWAN COUNTY										
TOTAL	186	186	186	186	0	0.0	0	0.0	0	0.0
URBAN	6	6	6	27	0	2.6	0	0.0	21	339.2
RURAL	180	180	180	159	0	-0.1	0	0.0	-21	-11.7
AGRIC	46	46	46	37	0	-0.1	0	0.0	-8	-18.5
SILVIC	133	133	133	121	0	-0.1	0	0.0	-12	-9.4
MINING	1	1	1	1	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 36										
TOTAL	454	454	454	454	0	0.0	0	0.0	0	0.0
URBAN	1	3	3	6	2	276.9	0	0.0	3	101.5
RURAL	453	451	451	448	-2	-0.5	0	0.0	-3	-0.7
AGRIC	107	106	106	104	-1	-1.2	0	0.0	-1	-1.6
SILVIC	334	333	333	332	0	-0.3	0	0.0	-1	-0.4
MINING	1	1	1	1	0	-6.3	0	0.0	0	0.0
WATER	12	12	12	12	0	0.0	0	0.0	0	0.0
BATH COUNTY										
TOTAL	22	22	22	22	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	22	22	22	21	0	0.0	0	0.0	0	-2.2
AGRIC	3	3	3	2	0	0.0	0	0.0	0	-15.4
SILVIC	13	13	13	12	0	0.0	0	0.0	0	-0.3
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	6	6	6	6	0	0.0	0	0.0	0	0.0
ELLIOTT COUNTY										
TOTAL	10	10	10	10	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	10	10	10	10	0	0.0	0	0.0	0	0.0
AGRIC	2	2	2	2	0	0.0	0	0.0	0	0.0
SILVIC	8	8	8	8	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MAGOFFIN COUNTY										
TOTAL	84	84	84	84	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	84	84	84	84	0	0.0	0	0.0	0	0.0
AGRIC	14	14	14	14	0	0.0	0	0.0	0	0.0
SILVIC	69	69	69	69	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL	30	30	30	30	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	30	30	30	30	0	0.0	0	0.0	0	0.0
AGRIC	8	8	8	8	0	0.0	0	0.0	0	0.0
SILVIC	20	20	20	20	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	3	3	3	3	0	0.0	0	0.0	0	0.0
MORGAN COUNTY										
TOTAL	234	234	234	234	0	0.0	0	0.0	0	0.0
URBAN	1	3	3	5	2	276.9	0	0.0	1	58.7
RURAL	234	231	231	230	-2	-0.9	0	0.0	-1	-0.8
AGRIC	67	66	66	65	-1	-1.9	0	0.0	0	-1.0
SILVIC	166	165	165	164	0	-0.5	0	0.0	-1	-0.7
MINING	1	0	0	0	0	-7.2	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
ROWAN COUNTY										
TOTAL	74	74	74	74	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	1	0	0.0	0	0.0	0	0.0
RURAL	74	74	74	73	0	0.0	0	0.0	0	-1.1
AGRIC	13	13	13	12	0	0.0	0	0.0	0	-5.0
SILVIC	58	58	58	58	0	0.0	0	0.0	0	-0.3
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	3	3	3	3	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 37										
TOTAL	53	53	53	53	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	4	0	37.7	0	0.0	2	328.2
RURAL	52	52	52	49	0	-0.5	0	0.0	-2	-5.8
AGRIC	9	9	9	8	0	-0.2	0	0.0	0	-5.7
SILVIC	44	43	43	41	0	-0.5	0	0.0	-2	-5.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL	53	53	53	53	0	0.0	0	0.0	0	0.0
URBAN	1	1	1	4	0	37.7	0	0.0	2	328.2
RURAL	52	52	52	49	0	-0.5	0	0.0	-2	-5.8
AGRIC	9	9	9	8	0	-0.2	0	0.0	0	-5.7
SILVIC	44	43	43	41	0	-0.5	0	0.0	-2	-5.8
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 38										
TOTAL	44	44	44	44	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	44	44	44	44	0	0.0	0	0.0	0	0.0
AGRIC	21	21	21	21	0	0.0	0	0.0	0	0.0
SILVIC	23	23	23	23	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MENIFEE COUNTY										
TOTAL	11	11	11	11	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	11	11	11	11	0	0.0	0	0.0	0	0.0
AGRIC	5	5	5	5	0	0.0	0	0.0	0	0.0
SILVIC	6	6	6	6	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MORGAN COUNTY										
TOTAL	30	30	30	30	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	30	30	30	30	0	0.0	0	0.0	0	0.0
AGRIC	15	15	15	15	0	0.0	0	0.0	0	0.0
SILVIC	15	15	15	15	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
WOLFE COUNTY										
TOTAL	3	3	3	3	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	3	3	3	3	0	0.0	0	0.0	0	0.0
AGRIC	1	1	1	1	0	0.0	0	0.0	0	0.0
SILVIC	2	2	2	2	0	0.0	0	0.0	0	0.0
MINING	0	0	0	0	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 39										
TOTAL	77	77	77	77	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	77	77	77	77	0	0.0	0	0.0	0	0.0
AGRIC	15	15	15	15	0	0.0	0	0.0	0	0.0
SILVIC	61	61	61	61	0	0.0	0	0.0	0	0.0
MINING	1	1	1	1	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MORGAN COUNTY										
TOTAL	77	77	77	77	0	0.0	0	0.0	0	0.0
URBAN	0	0	0	0	0	0.0	0	0.0	0	0.0
RURAL	77	77	77	77	0	0.0	0	0.0	0	0.0
AGRIC	15	15	15	15	0	0.0	0	0.0	0	0.0
SILVIC	61	61	61	61	0	0.0	0	0.0	0	0.0
MINING	1	1	1	1	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
SEGMENT NUMBER 40										
TOTAL	200	200	200	200	0	0.0	0	0.0	0	0.0
URBAN	2	4	4	4	2	163.3	0	0.0	0	6.7
RURAL	198	195	195	195	-2	-1.3	0	0.0	0	-0.1
AGRIC	33	32	32	32	-1	-3.4	0	0.0	0	-0.6
SILVIC	159	158	158	158	-1	-0.9	0	0.0	0	-0.1
MINING	6	6	6	6	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0
MAGOFFIN COUNTY										
TOTAL	200	200	200	200	0	0.0	0	0.0	0	0.0
URBAN	2	4	4	4	2	163.3	0	0.0	0	6.7
RURAL	198	195	195	195	-2	-1.3	0	0.0	0	-0.1
AGRIC	33	32	32	32	-1	-3.4	0	0.0	0	-0.6
SILVIC	159	158	158	158	-1	-0.9	0	0.0	0	-0.1
MINING	6	6	6	6	0	0.0	0	0.0	0	0.0
WATER	0	0	0	0	0	0.0	0	0.0	0	0.0

SEGMENT BREAKDOWN	LAND USE "AT-YEAR"				LAND USE AREA AND PERCENTAGE "BETWEEN-YEAR"					
					1970-75		1975-80		1980-95	
	1970	1975	1980	1995	NO.	%	NO.	%	NO.	%
LICKING RIVER BASIN										
TOTAL	3688	3688	3688	3688	0	0.0	0	0.0	0	0.0
URBAN	84	114	114	214	30	35.7	0	0.0	100	87.7
RURAL	3604	3574	3574	3474	-30	-0.8	0	0.0	-100	-2.8
AGRIC	2240	2224	2224	2147	-16	-0.7	0	0.0	-77	-3.5
SILVIC	1345	1331	1331	1309	-13	-1.0	0	0.0	-22	-1.7
MINING	7	7	7	7	0	-0.5	0	0.0	0	-0.9
WATER	12	12	12	12	0	0.0	0	0.0	0	0.0

Appendix A-7

SURFACE AREA DISAGGREGATION

This appendix contains information on the surface area within the Basin, as disaggregated by county and segment. The number of square miles of surface area contained in a specified county and segment may be determined by entering the matrix from the list of counties and segments and reading the surface area at the intersection of the two paths. County and segment total surface areas are contained in the extreme bottom row and far right columns respectively.

The information contained in Exhibit A-7.1t was generated from the ADAPT data base. Each cell in the ADAPT data base contains the surface area of the cell, its county and its segment.

The information provided here was determined by a computer generated summation of the ADAPT data base.

Exhibit A-7t - Surface Area Disaggregation by Segment and County (Area in Square Miles) - Licking River Basin

Segment No.	Campbell	Kenton	Boone	Grant	Pendleton	Bracken	Mason	Lewis	Fleming	Robertson	Nicholas	Harrison	Bourbon	Clark	Montgomery	Bath	Rowan	Elliott	Morgan	Menifee	Wolfe	Magoffin	Total
1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
2	40	18	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103
3	0	53	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58
4	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
6	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
7	0	32	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33
8	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
9	0	15	0	42	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121
10	0	0	0	0	32	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47
11	0	0	0	0	45	0	0	0	0	0	0	142	0	0	0	0	0	0	0	0	0	0	187
12	0	0	0	34	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52
13	0	0	0	12	6	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	23
14	0	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	54
15	0	0	0	0	0	0	0	0	0	0	0	37	28	0	0	0	0	0	0	0	0	0	65
16	0	0	0	0	0	0	0	0	0	0	86	0	80	1	71	17	0	0	0	0	0	0	256
17	0	0	0	0	0	0	0	0	0	0	0	0	104	0	0	0	0	0	0	0	0	0	104
18	0	0	0	0	0	0	0	0	0	0	0	0	42	47	1	0	0	0	0	0	0	0	90
19	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
20	0	0	0	0	0	0	0	0	0	0	0	0	30	51	0	0	0	0	0	0	0	0	82
21	0	0	0	0	34	1	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	50
22	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
23	0	0	0	0	0	69	74	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	174
24	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
25	0	0	0	0	0	0	14	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	22
26	0	0	0	0	0	0	35	32	20	0	0	0	0	0	0	0	0	0	0	0	0	0	87
27	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
28	0	0	0	0	0	1	19	0	80	68	107	59	0	0	0	46	14	0	0	0	0	0	393
29	0	0	0	0	0	0	0	0	97	0	1	0	0	0	0	0	0	0	0	0	0	0	98
30	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	33
31	0	0	0	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	118
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	104	0	0	0	26	0	0	230
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	48	0	0	0	0	0	0	51
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36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	74	10	234	30	0	84	454
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	53
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	11	3	0	44
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	0	0	0	77
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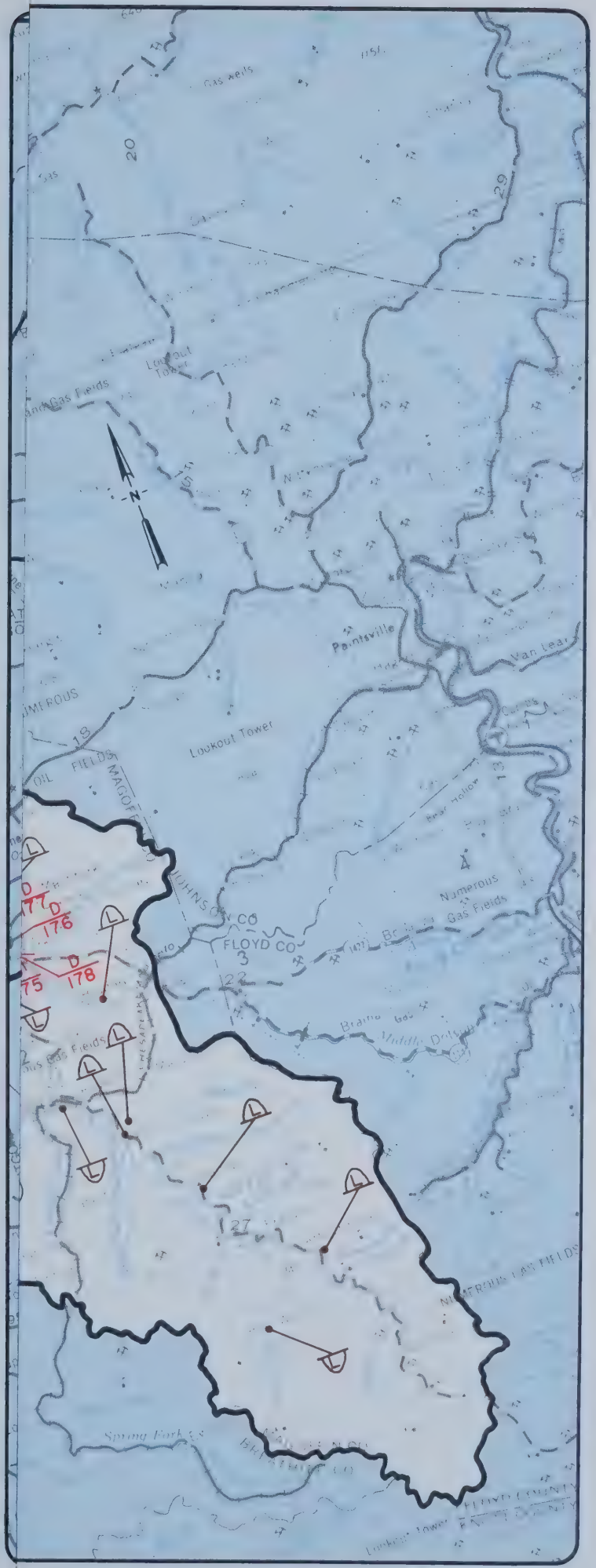

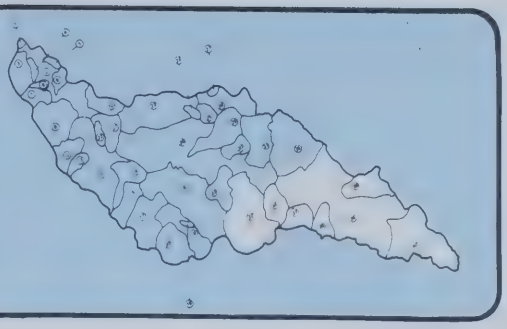

EXHIBIT B-1.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- D 3 / D 5 DOMESTIC DISCHARGER
- M 4 / M 5 MUNICIPAL DISCHARGER
- I 7 / I 9 INDUSTRIAL DISCHARGER

5 0 5

Scale 1:250,000

KENTUCKY WATER QUALITY MANAGEMENT PLAN

Prepared for Division of Water Quality

KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION

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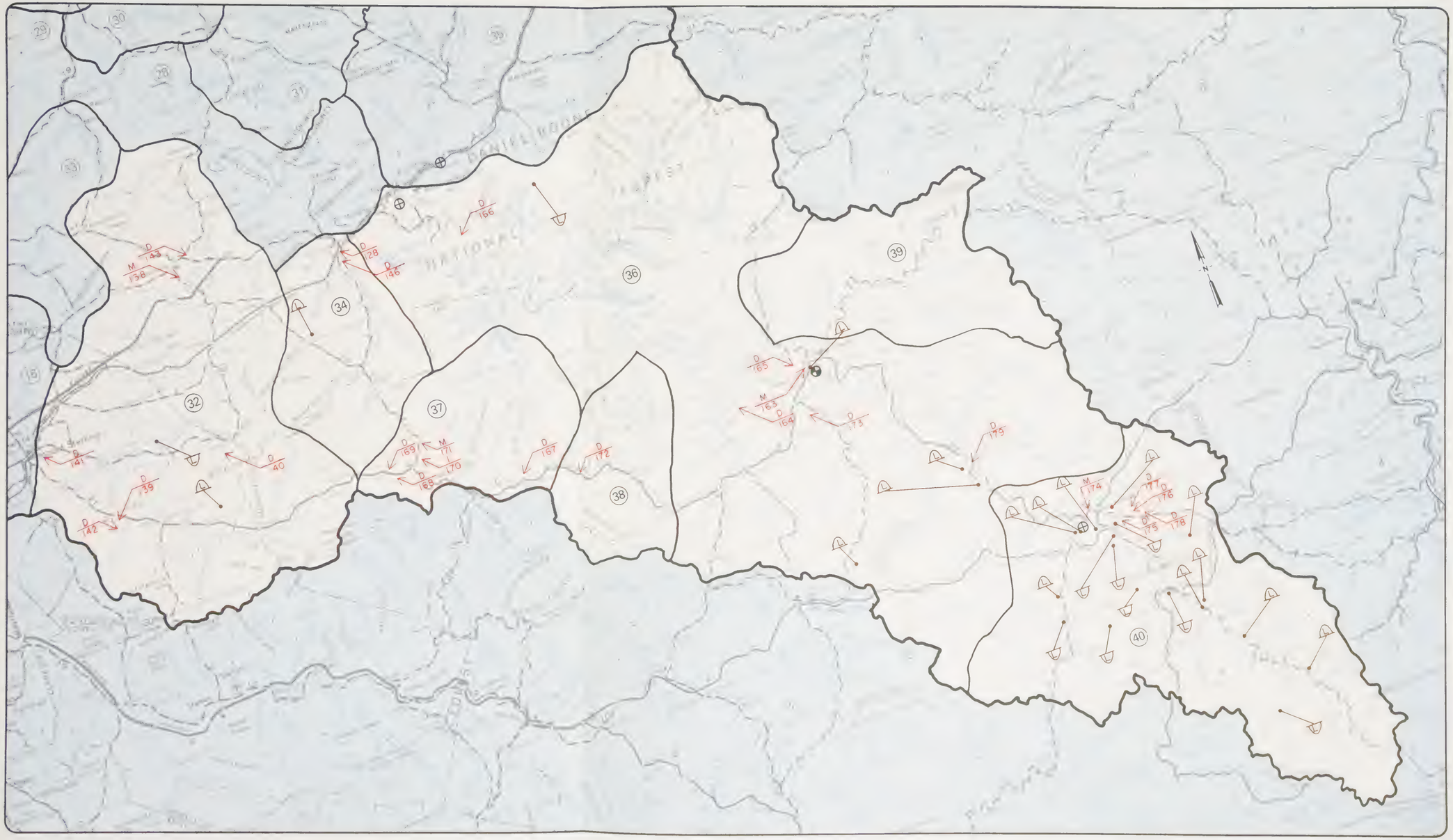

EXHIBIT B-1.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- DOMESTIC DISCHARGER
- MUNICIPAL DISCHARGER
- INDUSTRIAL DISCHARGER

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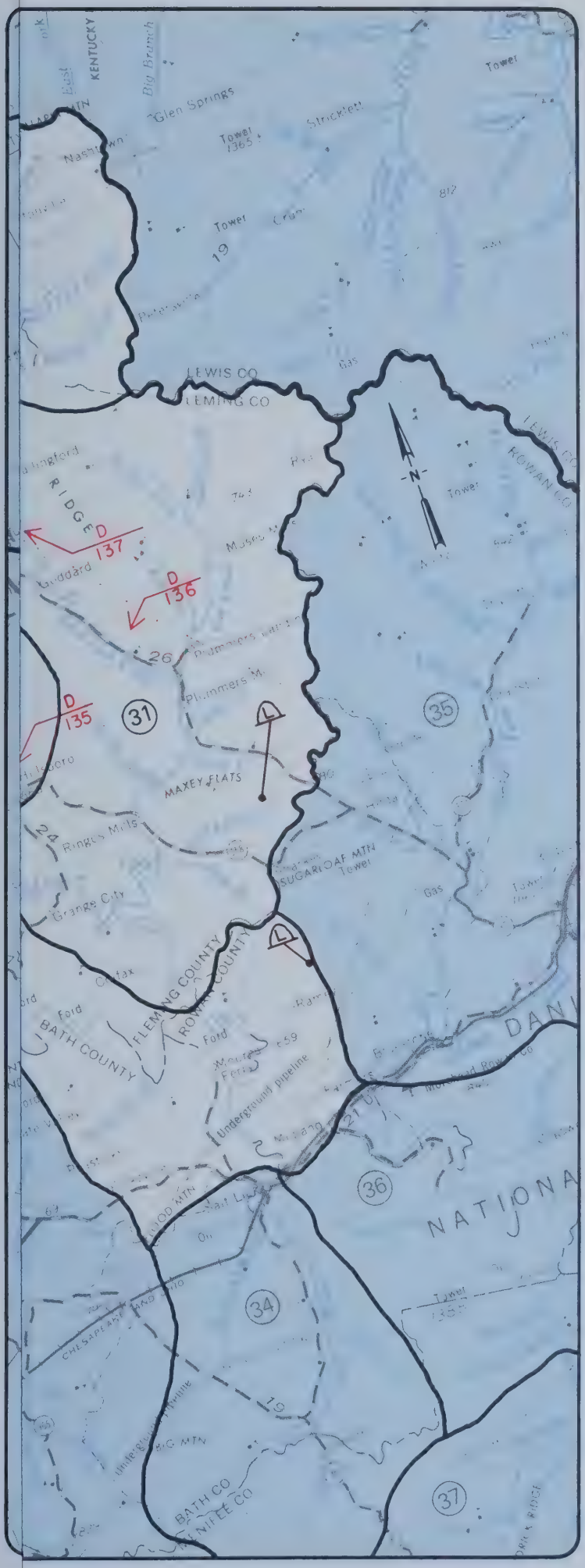

EXHIBIT B-2.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- (L) SOLID WASTE DISPOSAL SITES
- (CS) COMBINED SEWER AREAS
- D/4 D/7 DOMESTIC DISCHARGER
- M/5 M/8 MUNICIPAL DISCHARGER
- I/3 I/2 INDUSTRIAL DISCHARGER

5 5

Scale 1:250,000

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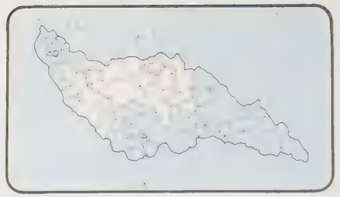

EXHIBIT B-2.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- (CS) COMBINED SEWER AREAS
- D 4 / D 7 DOMESTIC DISCHARGER
- M 5 / M 8 MUNICIPAL DISCHARGER
- I 3 / I 2 INDUSTRIAL DISCHARGER

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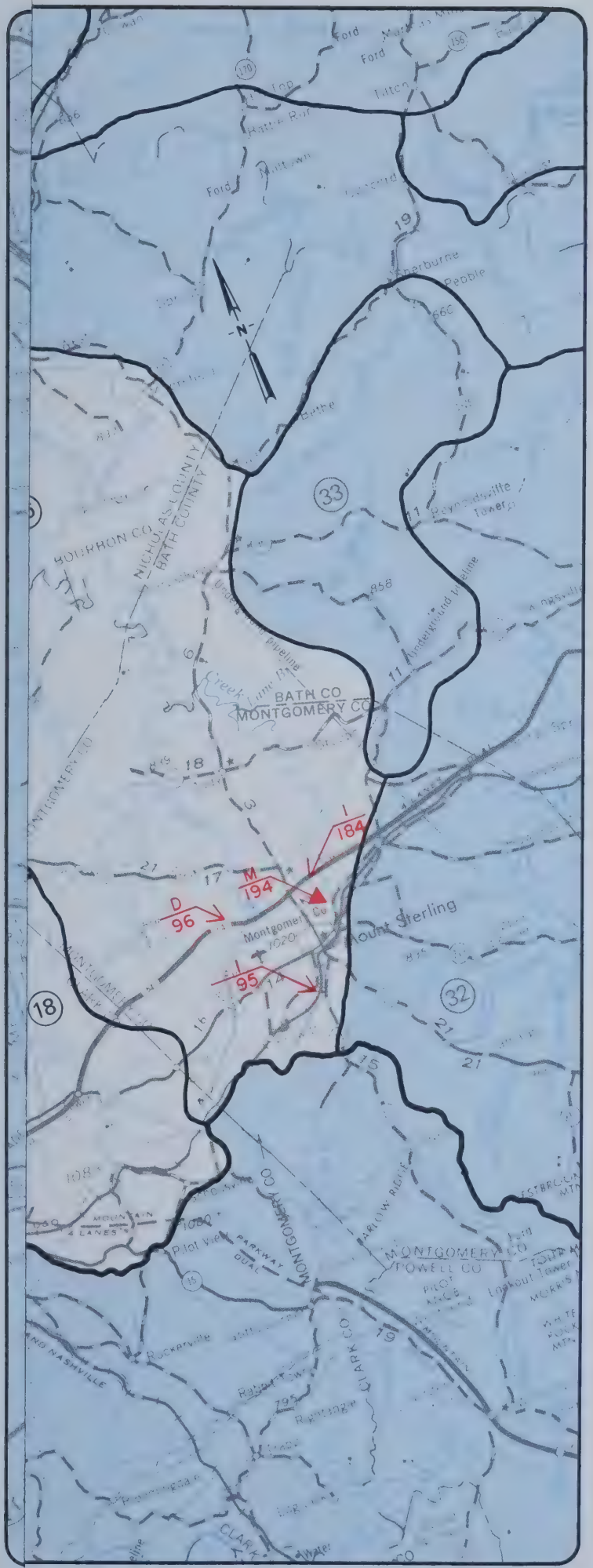

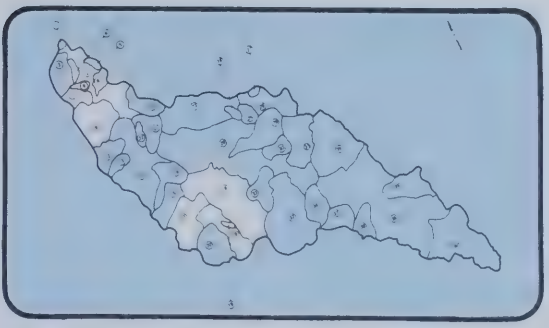

EXHIBIT B-3.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SEPTIC TANK DRAINAGE OR RAW SEWAGE PROBLEMS
- D 5 / D 8 — DOMESTIC DISCHARGER
- M 2 / M 6 — MUNICIPAL DISCHARGER
- I 4 / I 9 — INDUSTRIAL DISCHARGER

5 0 5

Scale 1:250,000

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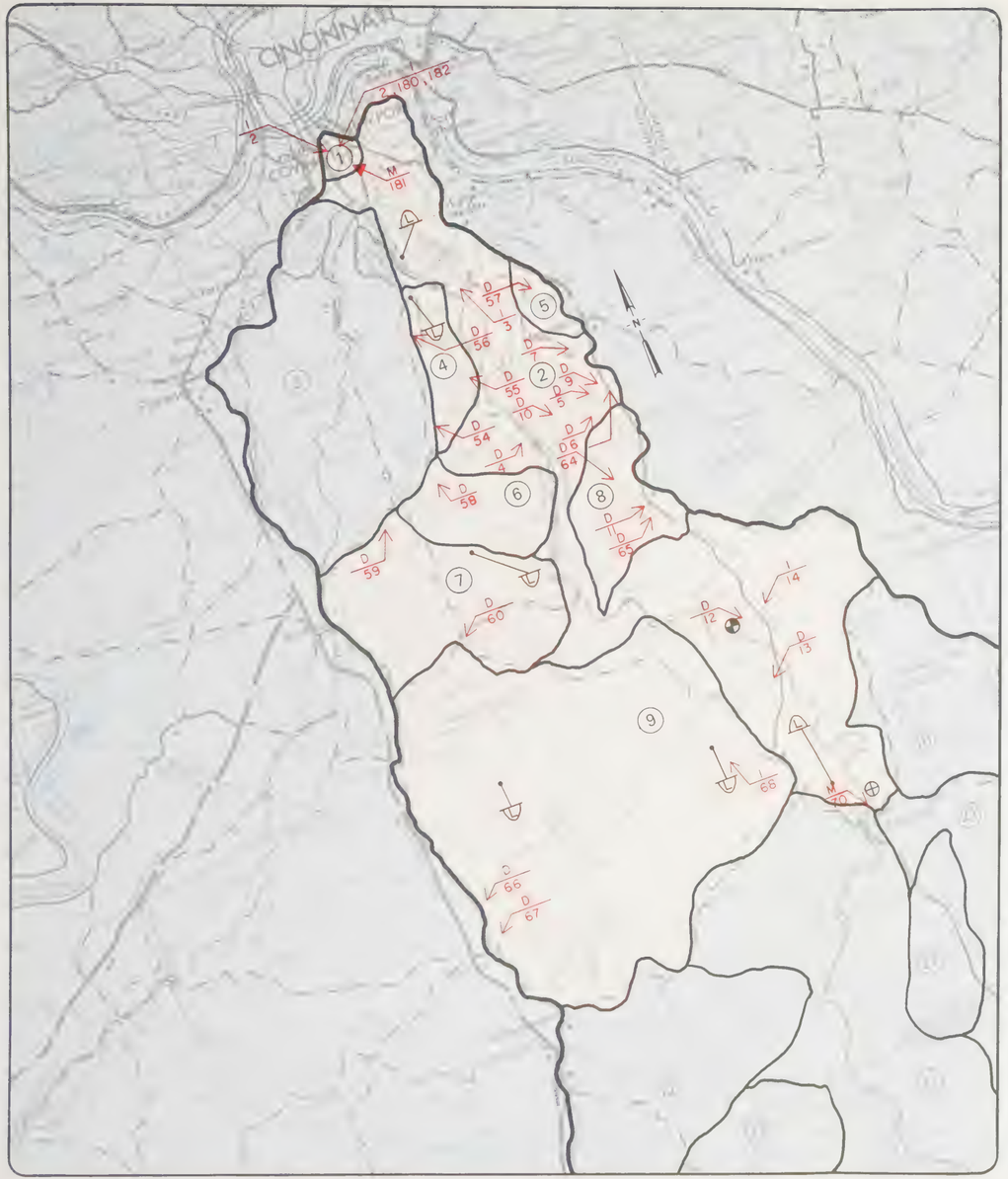

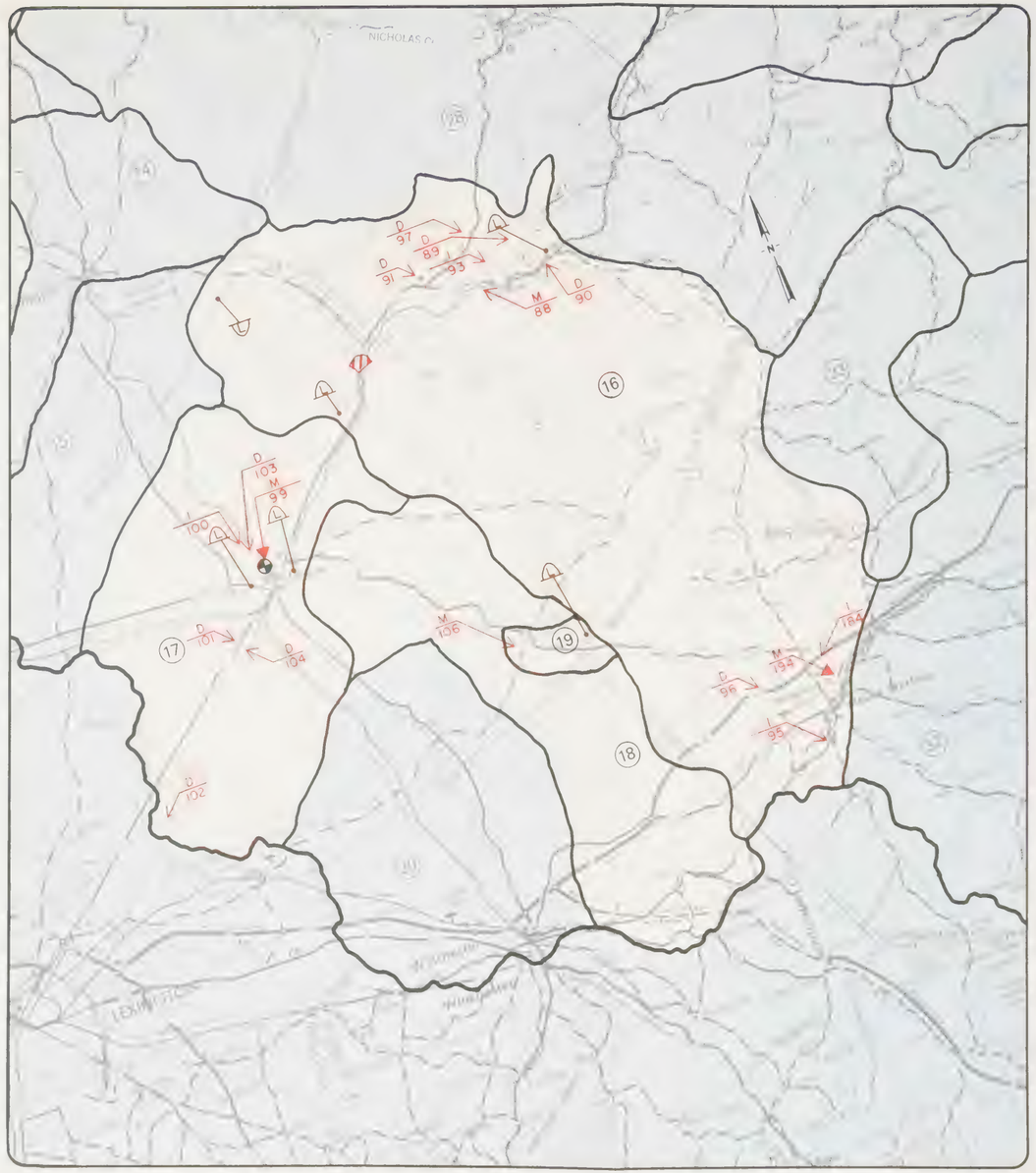

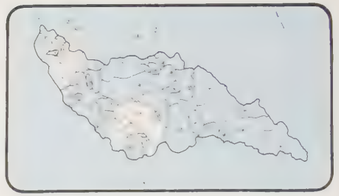

EXHIBIT B-3.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SEPTIC TANK DRAINAGE OR RAW SEWAGE PROBLEMS
- DOMESTIC DISCHARGER
- MUNICIPAL DISCHARGER
- INDUSTRIAL DISCHARGER

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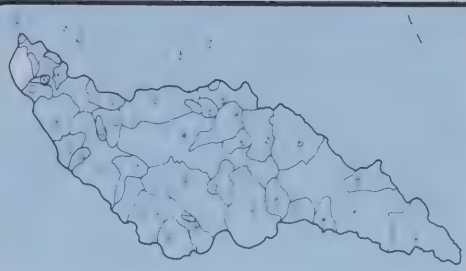

EXHIBIT B-4.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- D 11 / D 2 — DOMESTIC DISCHARGER
- M 21 / M 3 — MUNICIPAL DISCHARGER
- I 5 / I 7 — INDUSTRIAL DISCHARGER

0 5

Scale 1 125,000

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EXHIBIT B-4.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- D 11 / D 2 — DOMESTIC DISCHARGER
- M 2 / M 3 — MUNICIPAL DISCHARGER
- I 5 / I 7 — INDUSTRIAL DISCHARGER

0 5

Scale 1:125,000

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EXHIBIT B-5.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- D 10 / D 2 — DOMESTIC DISCHARGER
- M 4 / M 18 — MUNICIPAL DISCHARGER
- I 7 / I 15 — INDUSTRIAL DISCHARGER

0 5

Scale 1 125,000

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Cincinnati, Ohio Washington D.C.

EXHIBIT B-5.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- D 10 / D 2 DOMESTIC DISCHARGER
- M 4 / M 18 MUNICIPAL DISCHARGER
- I 7 / I 5 INDUSTRIAL DISCHARGER

0 5

1 inch = 1 125,000

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EXHIBIT B-6.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- D 2 / D 9 — DOMESTIC DISCHARGER
- M 31 / M 5 — MUNICIPAL DISCHARGER
- I 7 / I 12 — INDUSTRIAL DISCHARGER

0 5

Scale 1:125,000

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EXHIBIT B-6.1m

SEGMENT MAP

LEGEND

- (15) SEGMENT NUMBERS
- PRIMARY MONITORING STATION
- SECONDARY MONITORING STATION
- SOLID WASTE DISPOSAL SITES
- DOMESTIC DISCHARGER
- MUNICIPAL DISCHARGER
- INDUSTRIAL DISCHARGER

0 5

1:125,000

KENTUCKY WATER QUALITY MANAGEMENT PLAN

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Appendix B

SEGMENT ANALYSES

INTRODUCTION

The main body of this report has been developed as an overview presentation of the 303(e) Plan development for the entire Basin. The background information on the physiographic, hydrologic, demographic and land use characteristics of the Basin is presented in Chapter III. The existing water quality management status of the Basin is developed in Chapter IV in terms of the water quality characteristics and management requirements, the characteristics of point and nonpoint source discharges, and the control technologies available for waste treatment management. In Chapter V, the basinwide management plan is presented in the dimensions of its fundamental elements, waste load allocations; segment prioritizations; basinwide facilities prioritization, 1980 treatment needs, and 1980 sewerage and treatment systems needs cost; future water quality monitoring requirements; the legal basis and land use control implications of the 303(e) Plan; and the interrelationships between this 303(e) Planning cycle, other/ongoing planning efforts, and subsequent 303(e) Planning cycles.

The purpose of this Appendix is to focus on what could be and was done in the present 303(e) Planning cycle; it is recognized that the process was not perfect. To this end, Appendix B has been organized into two parts; this (the first) part having the objective of providing a context for interpreting information of specific interest in the report, and the second part containing concise summaries of the information developed and applied in developing the 303(e) Management Plan in each of the 40 segments in the Licking River Basin. In the first part of the presentation (Appendix B-0), a summary is presented of the processes whereby the elements of the 303(e) Plan were developed, including: existing and projected development patterns; segment classification; 1980 treatment requirements, municipal needs for 1980, etc. Because the stated goal of PL 92-500 that all waste discharges are to be eliminated by 1985, has not been placed in any specific planning framework, no treatment requirements or municipal needs were developed for 1995 in this 303(e) Planning cycle.

The information presented in the second part (Appendices B-1 to B-40, where the numerical digits in the Appendix code are identical to the segment code) is intended to focus on the segment as the basic management unit in 303(e) Planning. The specific planning and modelling information used in developing the plan for each segment are presented, the details of the plan are defined, and the water quality management strategy is set forth.

In support of the discussions presented in Appendices B-1 to B-40, a series of maps showing the location and orientation of each of the segments in the Basin have been developed, and are presented in Exhibits B-0.1m to B-0.3m. The segments shown in the Exhibits are the existing segment definitions, the origin and significance of which is indicated in Chapters I and V.

DEVELOPMENT OF PLANNING INFORMATION

Any planning process is by nature a dynamic and interactive process which, when institutionalized as is the case with 303(e) Planning on a statewide basis, can rapidly become inconsistent and/or constrained if the requisite interaction does not take place. Ideally, to maximize the opportunity for interaction and adjustment of the planning process as new information is developed and evaluated, one seeks to utilize planning tools which easily permit the planner to upgrade the process in response to new information and changed priorities. ADAPT, as the planning tool selected and developed to facilitate the management of information in this Basin 303(e) Planning cycle, was completely online in the latter stages of the effort (when the program activities were involved with the development of municipal needs).

Planning Process

The actual planning process was comprised of two major effort areas which were only loosely interrelated until the end of the planning process. The two areas as defined in Chapter V, were the land based activities and the water quality based activities. ADAPT was the focal point of the former and stream modeling was the focal point of the latter activity.

Water Quality Based Activities

The stream modeling process involved the use of a stream water quality simulation model developed and operated by UK/UL (the University of Kentucky/ University of Louisville). The inputs required for the stream model and the methodology used in developing the model data base are outlined below:

- The design flow (i.e. the 7 day Q_{10} low flow) Hydrology in a segment was defined as the sum of:
  - minimal low flow (summer) season release schedules from impoundments operated by the Corps of Engineers.
  - seven day Q_{10} flows entering the segment from upstream segments and developed within the segment.
  - estimated flow rates from waste discharges in the segment to the streams of the segment.

(It is noted that surface water withdrawals for public and private water supplies were assumed to not have an impact on the design flow hydrology, and that a most serious requirement for subsequent 303(e) Planning cycles is the refinement of the design flow hydrology).

- The stream standards of the State of Kentucky, which by definition specify the 1980 compliance goal for Basin planning; the critical standards which governed in almost every case the type of treatment required as of 1980 were developed with the intent of protecting aquatic life, and are stated as follows:

- .. the DO (dissolved oxygen concentration) shall average at least 5.0 mg/l on any calendar day (i.e. DO $\geq$ 5.0 mg/l).
- .. The NH_3 -N (ammonia-nitrogen) concentration in the receiving waters downstream from a waste treatment facility shall not exceed four mg/l (i.e. NH_3-N $\leq$ 4.0 mg/l).

. Estimates of the type of treatment required at each discharge to meet the above critical standards, which were developed in consideration of:
- .. preliminary stream modeling runs made by UK/UL.
- .. an interrelationship between treatment type required and stream flow and measures of stream assimilative capacity, developed by Dr. Foree of UK.
- .. a schedule specifying the types of alternative treatment systems to be considered.

. Stream slope data.

The above information was used in the computerized stream modelling work done by UK/UL, which resulted in the development, for the streams of the Basin, of DO and NH_3-N profiles for existing and proposed 1980 point source treatment levels. In the stream reaches where it was ascertained from the modeling results that one or both of the critical standards were violated, the type of treatment specifiedin the modeling run was adjusted upward (to a more stringent level). Under normal planning procedures additional modeling runs would have been done to test the efficacy of the adjustment in type of treatment on increasing stream quality to the minimal extent necessary for compliance with the stream standards; however, time and other constraints precluded perpetuating the cycle to the attainment of optimal results.

In addition to the preceding limitations on the planning process as required in this 303(e) Planning cycle, a second constraint was the range of choice of alternative types of treatment that could be considered, and the manner in which they could be used. Associated with the types of treatment systems that could be selected from were large increments in the effluent quality generated (and correspondingly large incremental increases in treatment system costs). Specifically, the increments in effluent ammonia nitrogen concentrations that the planners could choose from were 20, 15 and one mg/l, and the increments in effluent DO concentration were four and eight mg/l. Given that the water quality management situation faced by most dischargers was that of having little or no upstream dilution water available (under the design flow conditions using in the stream modeling), then the treated effluent discharged to the receiving stream had to meet the critical stream standards of $\geq$ 5 mg/l DO and $\leq$ 4 mg/l NH_3-N as discharged. Because there existed no type of alternative treatment system that specifically met, but did not exceed, these requirements, it was necessary to specify the most rigorous treatment type in these cases. That is, the treatment costs for these discharge situations had to be based on "buying" an effluent containing 3 mg/l DO more, and 3 mg/l NH_3-N less, than required by the stream standards at the point of discharge. Nor was it possible, in this 303(e) Planning cycle, to postulate the "split flow" treatment of municipal wastewater flows (one portion at a lower treatment level, the second at a higher level) to produce a "blended " effluent having the requisite DO and NH_3-N concentrations at the minimum cost to the discharger. Thus, in subsequent 303(e) Planning cycles, it is recommended that the types of treatment alternatives available for consideration be expanded.

The schedule of treatment requirements that evolved from the stream modeling process was used in the process of calculating the waste load allocations assigned to each discharger. The waste load allocations were calculated by UK/UL using a technical approach that did not take into account the economic, social, or other dimensions of the implications of a waste load allocation. The stream modeling procedure was also used to generate stream reaction rates, which are measures of the rate at which a stream reach can assimilate the TOD content of treated effluents.

The waste load allocations and the stream reaction rates were then used to determine two key parameters for each segment: the maximum theoretical daily load (MTDL) and the total maximum daily load (TMDL). The TMDL is defined as the summation of all waste load allocations within a segment in units of lb TOD/day and is thus a measure of the allowable loadings for the existing pattern of discharges that is a function of the method used to calculate the waste allocations and the type of treatment specified. The MTDL is a measure of the assimilative capacity of the main stem of the segment, and thus corresponds to the maximum allowable rate at which TOD can be discharged to the receiving streams of the segment under optimal apportioning of the discharge quantities to the streams of the segment. Thus, the ratio of MTDL to TMDL is a measure of the efficiency at which the assimilative capacity of the stream of the segment is being utilized, and the difference between the TMDL and MTDL is a measure of the unused assimilative capacity.

The procedure used in calculating the TMDL leads to conservative (low) estimates of this parameter in some cases for the following reasons:

. The procedure deals only with the assimilative capacity of the main stem, and does not include the assimilative capacity of streams tributary to the main stem.

. The procedure deals only with the assimilative capacity within the segment and does not deal with assimilative capacity interrelationships between the segment and contiguous (upstream and downstream) segments.

Additionally, in the computational procedure, the computed values of MTDL were rounded off to the nearest whole number, resulting in reported values of TMDL equal to zero in several segments.

The final step in the stream modelling process was the calculation of segment classifications and priorities. The procedures used in the classification of segments as WQL (water quality limited) or EL (effluent limited) and in segment prioritization are presented in Chapter V. As water quality management efforts in the Basin proceed, the consequence of the constraints on the stream modeling need to be examined on a case by case basis, i.e., there is presently insufficient basinwide management pressure to justify a basinwide examination of the consequence.

Municipal Needs Determination

The process leading to the determination of municipal needs was implemented at a (later) period

in the Planning effort when a detailed and updated information base was available for estimation of the treatment plant hydraulic capacities associated with 1980 municipal needs than was available/ used earlier in the development of the design flow hydrology for stream modeling. The updated data base available for the development of municipal needs was the disaggregated 1980 urban population data base in ADAPT, as described in Chapter III and Appendix A-2.

The municipal needs were determined for the 1980 time horizon using the procedure described in Chapter V. From the schedule of municipal needs developed in this step, and segment prioritizations developed as the last step in the stream modeling process, municipal prioritization was done according to procedures also discussed in Chapter V. The specifics of the segment and discharge prioritization processes specified by DNREP and EPA, and DNREP respectively are described below:

Segment Prioritization

Formulation of Segment Priorities

The following is the procedure for assigning priority values to each stream segment in the State of Kentucky. The priority assigned to a segment is an important factor in allocating resources, conducting monitoring and special studies and in taking abatement actions. The priority ranking is required by 40 CFR 130.41 to reflect the following:

- Severity of pollution problems.
- Population affected.
- Need to preserve high quality waters.
- National priorities.
- Factors identified by the state.

Objective

The primary objective of the procedure is to yield a systematic means of comparing segments in different locations on a common basis, to produce a priority list and to guide management decisions. The process should be as objective and quantifiable as possible, and should be reproduceable on the basis of the data available. Since the segment priority is a key factor in allocating federal funds for abatement activities, it is important that the process be defensible and understandable to the general public.

Segment Priority Formula

$$\text{Priority} = \frac{P}{1,000} + (BOD_5 + SS + NH_3 + PO_4 + \text{Metals} + T + NP)$$

The Formula is explained a factor at a time as follows:

1. Population affected = $\frac{P}{1,000}$
   People are affected by water pollution in at least two ways. (1) Pollution may reduce the economic, recreation and aesthetic values of the water to persons who might otherwise gain or benefit from clean water; (2) People will be required to pay, either directly or indirectly for pollution control. Therefore, it is reasonable to include the population in the segment, which responds to the federal regulations.

2. Severity of pollution = (BOD + SS + NH_4 + PO_4 + Metals)
   The severity of pollution along with factors identified by the state are contained in a collection of terms which define allowable limits of waste strength which (BOD) result in the effect of the oxygen resources of the stream, (SS) the sedimentation load in the stream which can form a benthic demand (NH_4 + PO_4) factors attributable to causing enrichment of the water nad (metals) finally toxic affects from the discharge of pollutants. The particular term is expressed in the equation as the difference between the most restrictive requirement and the amount discharged in pounds per day. To determine the most restrictive requirement three informational sources must be examined: (1) the definition of secondary waste treatment, which is basically 30 mg/l BOD and 30 mg/l of suspended solids supplement by an ammonia nitrogen limitation of 4 mg/l in the receiving stream. (2) The NPDES permit which contains specific requirements for BOD and suspended solids and in some cases ammonia nitrogen. (3) The waste load allocation from the "Kentucky Waste Load Allocation Model" developed by UK/UL. The metals in the collection of terms are to apply to industries only and is computed as the difference between the wastewater characteristics and best practical treatment or NPDES limitations.

3. Special Impact - Thermal = T
   In addition to the strength factors described under severity of pollution cooling water effects are included in the segment priority formulation using the °F above allowable times the flow in million gallons per day.

4. Special Impact - Nonpoint Sources = NP
   The nonpoint source factor is a term which allows for 100 points where significant nonpoint sources occur. The term significant is to be applied using the following information for judgment.
   a. Acid mine drainage will be considered significant when the stream is continuously impregnated with acid mine drainage to the extent that the pH is depressed below pH 6 at least 90% of the time or pH 5 at least 50% of the time.
   b. Strip mining will be considered a significant impact if the present control techniques utilizing sedimentation basins is not sufficient to prevent a substantial increase in suspended solids in the main stem of the river.
   c. Combined sewers will be considered significant when sufficient when the yearly average combined sewage overflow at least equals the treated effluent flow.
   d. Surface runoff from urban areas will be considered significant when the population affected is 10 or more.

Please note that a maximum of 100 points is allowed regardless of the number of judgment factors which might be answered in the affirmative.

Discharge Prioritization

Municipal Construction Grant Priority Formula

This formula is developed using the following information: the segment priority (except metals, thermal and nonpoint source), the national interest the "needs" survey and the 201 project status. The estimated cost of the project within a given segment is used as a proportion of that cost times the appropriate factor which relates to items 1 through 5 below and multiplied by the segment priority (except metals, thermal and nonpoint source). Items 1 through 5 are then added which results in the municipal construction grant formula.

1.	Treatment	Factor
	T1	2
	T2	2.5
	T3	3.5
	T4	4.5
	T5	6
2.	Infiltration/Inflow	1.5
3.	Interceptor	2
4.	Collection Sewers	1
5.	Combined Sewers	0.5

After the priority number is obtained, a capital letter is assigned depending on the population status as follows:

A is assigned for a community in a SMSA.
B is assigned if a community is over 10,000 and not in a SMSA
C is assigned if a community is less than 10,000 and not in a SMSA.

An additional lower case letter is assigned as the project relates to the 201 status as follows:

a. Step No. 1 initiation
b. Step No. 2 initiation
c. Step No. 2 completion

Information Presentation

The intent of the segment by segment presentations in Appendices B-1 to B-40 is to summarize pertinent segment information for 303(e) Planning. The location of each segment in relationship to adjoining ones and the location and type of point and nonpoint sources within the segment is presented in Exhibit B-0.1m to B-0.3m.

For each segment, the basic demographic and physical planning data and water quality information is graphically summarized in a series of profiles. These profiles contain the above information in a River Mile format designed to display the information in reference to location along the mainstem of the segment. The following types of information are contained in the profiles:

- Population, housing units, employment by category, and drainage area tributary to each point along the mainstem of the segment, inclusive of population, employment, housing, and drainage area tributary to all upstream segments; these profiled data bases were developed using ADAPT.
- Existing DO and NH_3-N concentrations along the mainstem, which were developed from predictions of stream response to existing wastewater discharges in the UK/UL stream modeling effort.
- "1980" DO and NH_3-N concentrations along the mainstem, developed from predictions (by UK/UL) of stream response to 1980 point source treatment levels.
- 7 day 10 year low flows along the mainstem, excerpted from the hydrologic data base used in the stream modeling.
- Estimated annual suspended sediment transport into and through the mainstem of the segment, developed using ADAPT.

In addition to the above profiles, each Segment presentation contains tables summarizing information excerpted from the Basinwide data bases presented in Chapters IV and V on the basic planning data, historical standards violations, existing discharge characteristics, waste load allocations, and municipal needs for the segment.

SEGMENT NO. 1 ANALYSIS

Classification: EL Priority: 180.7

Description

The location of Segment No. 1 is shown in the Segment Map of Exhibit B-0. 1m , and Exhibit B-1 .1g. The former map shows the relative position of Segment No. 1 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 1 are listed in Exhibit B- 1.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 1 (population, housing units, employment, and land use) are presented in Exhibit B- 1.2t and profiles of 1980 data are presented in Exhibit B- 1.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Northern Kentucky Asphalt-Industrial - RM 1.5
- Interlake Steel - Industrial - RM 2.0

This Segment encompasses 5 square miles of which 100 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B- 1.1g. The 7 day Q_{10} flow of 73.6 cfs at the upstream of the segment (RM 2.3) increases to 73.8 cfs at the downstream (RM 0.0). The total flow augmentation within the Segment is 50 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 1.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 1.3t) with which to document the historical record of standards contraventions in Segment 1 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 1 are listed and characterized in Exhibit B- 1.4t. The total waste flows from the point sources is 0.8 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 1.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 1.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (47.29lb/day of TOD) is compared with the maximum theoretical load of 3418 lb/day of TOD. The segment priority assigned to Segment 1 is 180.7.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 1 are presented in Exhibit B- 1.6t.

Segment Strategems

Although only 2.3 miles long, this reach of the Licking River is bounded by the major population and industrial center in the Basin. The municipal wastewater from the area is discharged to the Ohio River; thus, very little of the available assimilative capacity is currently being utilized by point sources. The possible demand by nonpoint sources, however, could be rather high. Nonpoint source estimates are currently being developed for Campbell, Kenton and Boone Counties in the OKI 208 Study. It can be expected that the OKI 208 Plan will attempt to define the character and extent of nonpoint sources in the Segment and alternative management strategies and programs.

Exhibit B-1.2t

LICKING RIVER BASIN

SEGMENT 1 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	40674	41577	42681	46643
RURAL	0	0	0	0
FARM	0	0	0	0
NON-FARM	0	0	0	0
URBAN	40674	41577	42681	46643
HOUSING UNITS				
TOTAL	14909	15454	16118	18333
RURAL	0	0	0	0
URBAN	14909	15454	16118	18333
EMPLOYMENT				
TOTAL	9018	10419	11069	12332
MANUFACTURING	1590	1932	2290	2315
NON-MANUFACTURING	7427	8486	9378	10017
LAND USE				
TOTAL	5	5	5	5
RURAL	5	0	0	0
AGRICULTURE	4	0	0	0
SILVICULTURE	0	0	0	0
MINING	0	0	0	0
URBAN	0	5	5	5

Exhibit B-1.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05002	Interlake Steel	Licking River 511.2/2.0	0002712	Extended Aeration	73.562	0.077	40	40	10
05180	Interlake Steel	Licking River 511.2/2.0	0002712	----------	73.562	0.572	---	---	---
05181	Interlake Steel	Licking River 511.2/2.0	0002712	----------	73.562	-----	---	---	---
05182	Interlake Steel	Licking River 511.2/2.0	0002712	----------	73.562	0.138	---	---	---
05001	Northern Kentucky Asphalt	Licking River 511.2/1.5	N.I.	Primary Sedimentation	93.682	0.048	3.4	25	0.1

Exhibit B-1.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
05002	Interlake Steel	19.27 BOD	0.077	30/85%	30/88%	20/20%	4	--------
05180	Interlake Steel	N.A.	----	----	----	----	--	--------
05181	Interlake Steel	N.A.	----	----	----	----	--	--------
05182	Interlake Steel	N.A.	----	----	----	----	--	--------
05001	Northern Kentucky Asphalt	13.76 BOD	0.055	30/85%	30/88%	20/20%	4	--------
	Segment 1	33.03 BOD						180.9

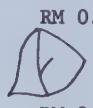
Exhibit B-1.6t - Municipal Needs - Licking River Basin

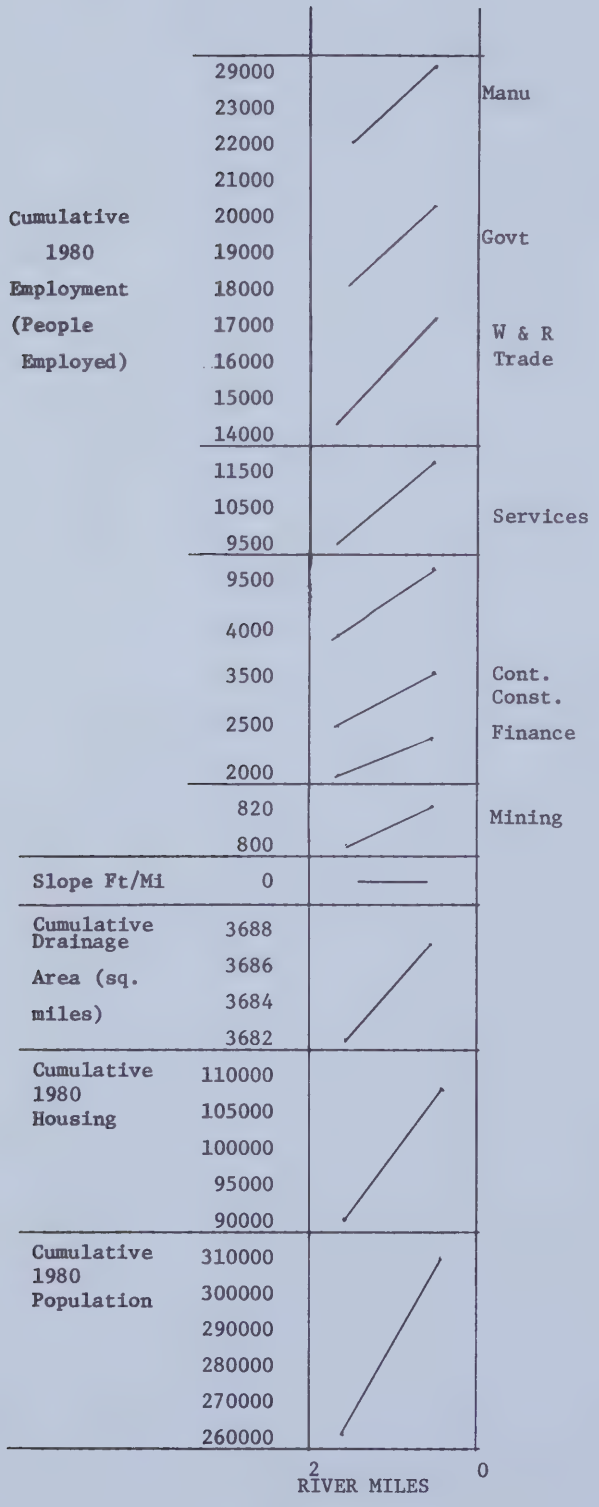
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

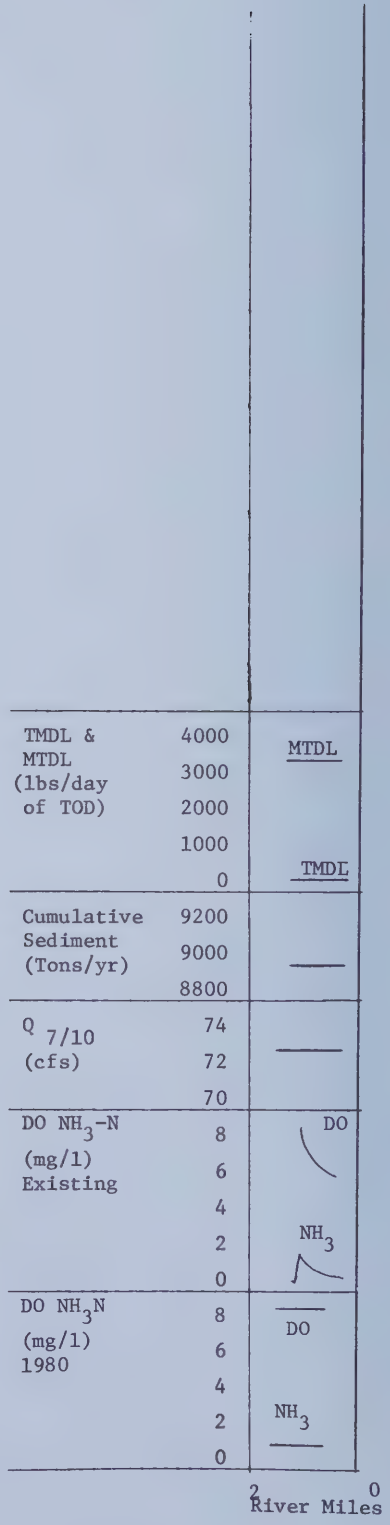
Exhibit B-1.1g - Licking River Basin, Segment No. 1

Upstream Segments: 2 **Downstream Segment:** --

Mainstem: Licking River







SEGMENT NO. 2 ANALYSIS

Classification: EL **Priority:** 178.2

Description

The location of Segment No. 2 is shown in the Segment Map of Exhibit B-0. 1m , and Exhibit B-2 .1g. The former map shows the relative position of Segment No. 2 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 2 are listed in Exhibit B- 2.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 2 (population, housing units, employment, and land use) are presented in Exhibit B- 2 .2t and profiles of 1980 data are presented in Exhibit B- 2.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Butler-Municipal - RM 34.8
- Falmouth-Municipal - RM 51.6
- L & N Railroad - Industrial - RM 8.0
- Geohegan & Mathias - Industrial - RM 37.1

This Segment encompasses 103 square miles of which 16.5 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-2.1.g. The 7 day Q_{10} flow of 70.6 cfs at the upstream of the segment (RM 51.7) increases to 73.6cfs at the downstream (RM 2.3). The total flow augmentation within the Segment is 50 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 2.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 2.3t) with which to document the historical record of standards contraventions in Segment 2 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 2 are listed and characterized in Exhibit B- 2 .4t. The total waste flows from the point sources is 0.7 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 2 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 2 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 2 .5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (387.91b/day of TOD) is compared with the maximum theoretical load of 58,623 1b/day of TOD. The segment priority assigned to Segment 2 is 178.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 2 are presented in Exhibit B- 2.6t.

Segment Strategems

The profiles in Exhibit B-2.1g show that the major determinant in Segment No. 2 is the Northern Kentucky Metropolitan Area, most significantly the Banklick Creek Drainage Basin (Segment #3), which enters at River Mile 4.7. The extremely large difference between the estimates of TMDL and MTDL (i.e. less than one percent of the allowable assimilation capacity is used in 1980) suggests the appropriateness of thoroughly reviewing the water quality standards applicable to this Segment and the proposed requirements for wastewater treatment technologies.

Exhibit B-2.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 2 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	26536	27751	29151	34779
RURAL	7700	7731	7557	7501
FARM	2329	2342	2306	2400
NON-FARM	5371	5388	5250	5101
URBAN	18838	20020	21594	27277
HOUSING UNITS				
TOTAL	8092	8575	9156	11374
RURAL	2246	2284	2275	2364
URBAN	5846	6291	6883	9009
EMPLOYMENT				
TOTAL	4025	4935	5873	7524
MANUFACTURING	790	985	1211	1464
NON-MANUFACTURING	3234	3949	4662	6059
LAND USE				
TOTAL	103	103	103	103
RURAL	102	94	94	94
AGRICULTURE	75	68	68	68
SILVICULTURE	27	25	25	25
MINING	0	0	0	0
URBAN	0	8	8	8

Exhibit B-2.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05070	Falmouth STP	Licking River 511.2/51.6	00021487	Conv. Act. Sludge	70.598	0.25	25	30	20
05013	Pendleton Country Club	Harris Cr./Licking 511.2/40.1/0.5	N.I.	Extended Aeration	0	0.008	40	40	10
05004	Geohegan & Mathias	Flour Cr./Licking 511.2/37.1/0.3	0001503	Sedimen-tation	0	0.30	0	---	0.31
05012	No. Elementary School	Willow Cr./Licking 511.2/35.1/.55	N.I.	Extended Aeration	0	0.012	40	40	10
05194	City of Butler	Licking River 511.2/34.8	0021041	Extended Aeration	70.598	0.055	40	40	13
05014	Visalia Ele-mentary School	UT - Licking - Ohio 511.2/19.4/.38	N.I.	Extended Aeration	0	0.0021	40	40	10
05009	Melissa Ann Apartments	UT - Pond Cr./Licking 511.2/17.9/4.2/.72	N.I.	Extended Aeration	0	0.0020	40	40	10
05008	Highway Main. Gar. Claryville	UT - Pond Cr./Licking 511.2/17.9/4.2/.74	N.I.	Extended Aeration	0	0.0017	40	40	10
05006	White Village Terrace	Pond Cr./Licking 511.2/17.9/5.1	N.I.	Extended Aeration	0	0.0060	40	40	10
05005	Bob White Club	Pond Cr./Licking 511.2/17.9/4.1	N.I.	Extended Aeration	.017	0.0008	40	40	10
05010	Americana Mobile Home Park	UT - Pond Cr./Licking 511.2/17.9/1.7/0.5	N.I.	Extended Aeration	0	0.016	40	40	10
05007	Highway Main. Gar. Alexandria	UT - Scaffold Cr./Licking 511.2/14.5/3.0/0.6	0025585	Extended Aeration	0	0.0017	40	40	10
05003	L & N Railroad	Licking River 511.2/8.0	0003131	Oil Re-covery Sedimen-tation	71.757	0.01	30	30	27

Exhibit B-2.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05070	Falmouth STP	67.55 BOD	0.27	30/85%	30/88%	20/20%	4	0 Ca
05013	Pendleton Country Club	0.75 BOD	0.000	10/95%	10/96%	1/96%	8	--------
05014	Geohegan & Mathias	19.18 BOD	0.23	10/95%	10/96%	1/96%	8	--------
05012	Northern Elementary School	1.08 BOD	0.013	10/95%	10/96%	1/96%	8	--------
05194	City of Butler	15.01 BOD	0.060	30/85%	30/88%	20/20%	4	21.6 Ca
05014	Visalia Elementary School	0.60 BOD	0.0024	30/85%	30/88%	20/20%	4	--------
05009	Melissa Ann Apartments	0.19 BOD	0.0023	10/95%	10/96%	1/96%	4	--------
05008	Highway Main. Garage Claryville	0.16 BOD	0.0019	10/95%	10/96%	1/96%	8	--------
05006	White Village Terrace	0.57 BOD	0.0068	10/95%	10/96%	1/96%	8	--------
05005	Bob White Club	0.23 BOD	0.0009	30/85%	30/88%	20/20%	4	--------
05010	Americana Mobile Home Park	1.50 BOD	0.018	10/95%	10/96%	1/96%	8	--------
05007	Highway Main. Garage Alexandria	0.16 BOD	0.0019	10/95%	10/96%	1/96%	8	--------
05003	L & N Railroad	2.50 BOD	0.01	30/85%	30/88%	20/20%	4	--------
Segment 2		109.48 BOD						178.2

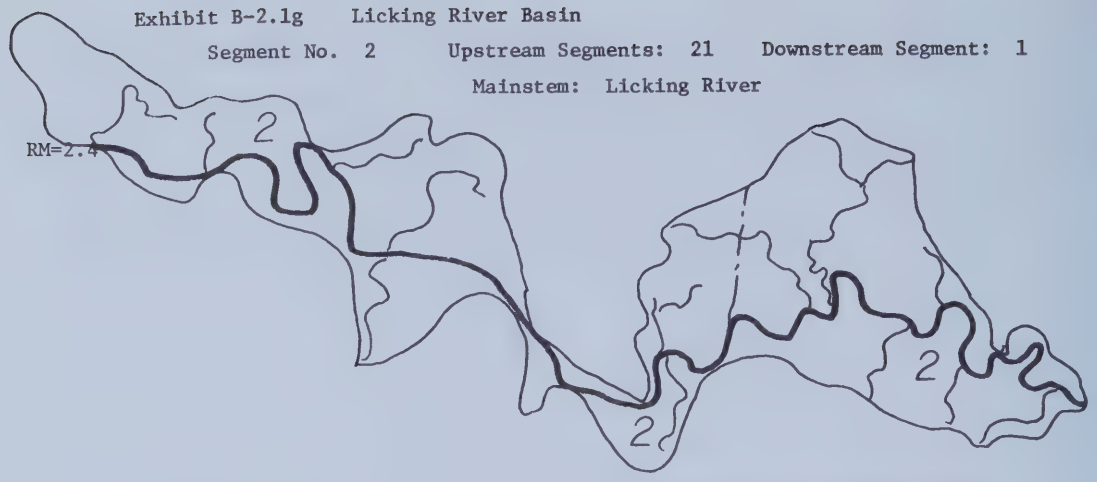
Exhibit B-2.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05070	Falmouth	TIA		1977
05194	Butler	TIA		1977
	Collectors	N.A.	229,000	

Exhibit B-2.1g Licking River Basin

Segment No. 2 Upstream Segments: 21 Downstream Segment: 1

Mainstem: Licking River



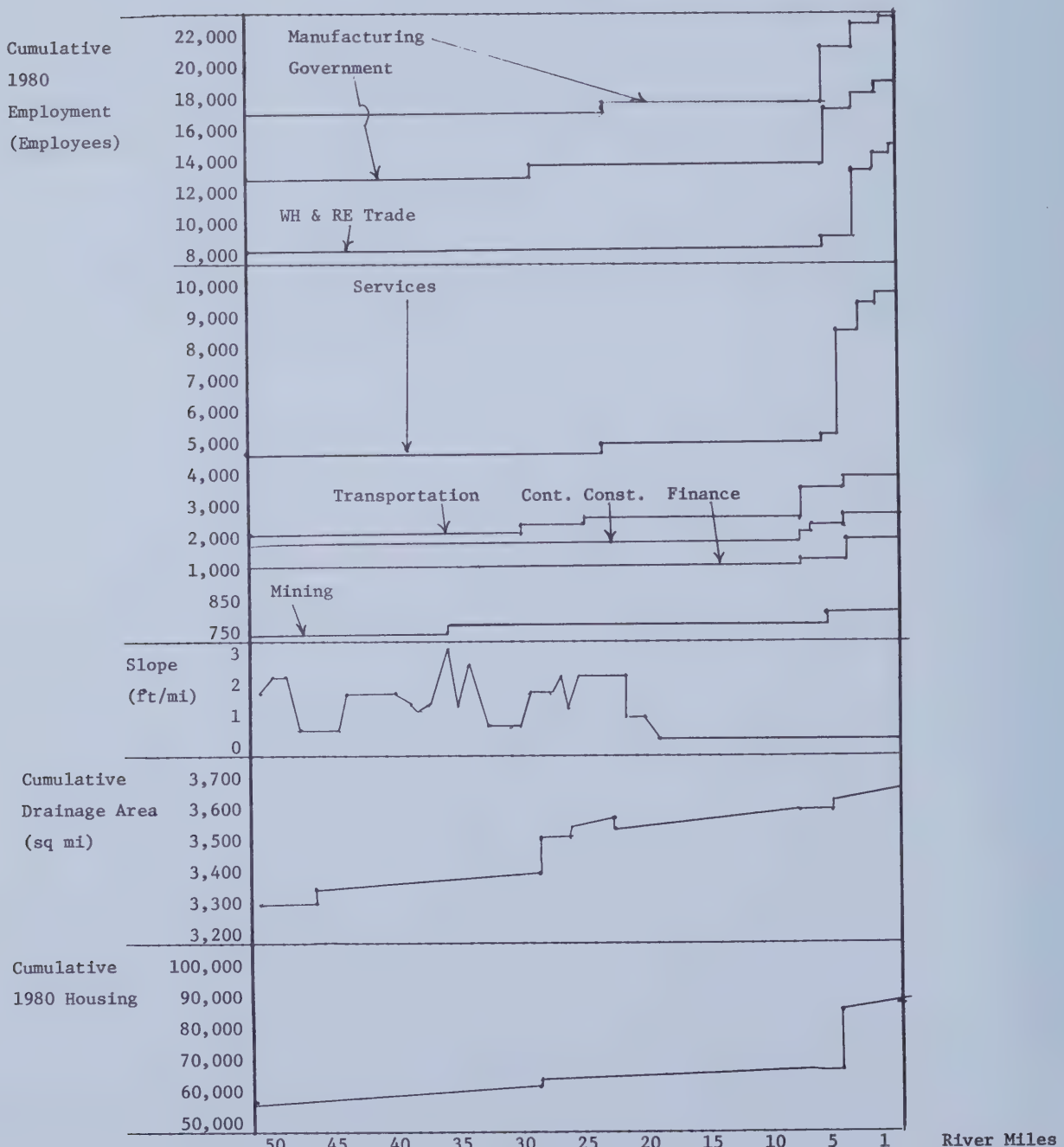
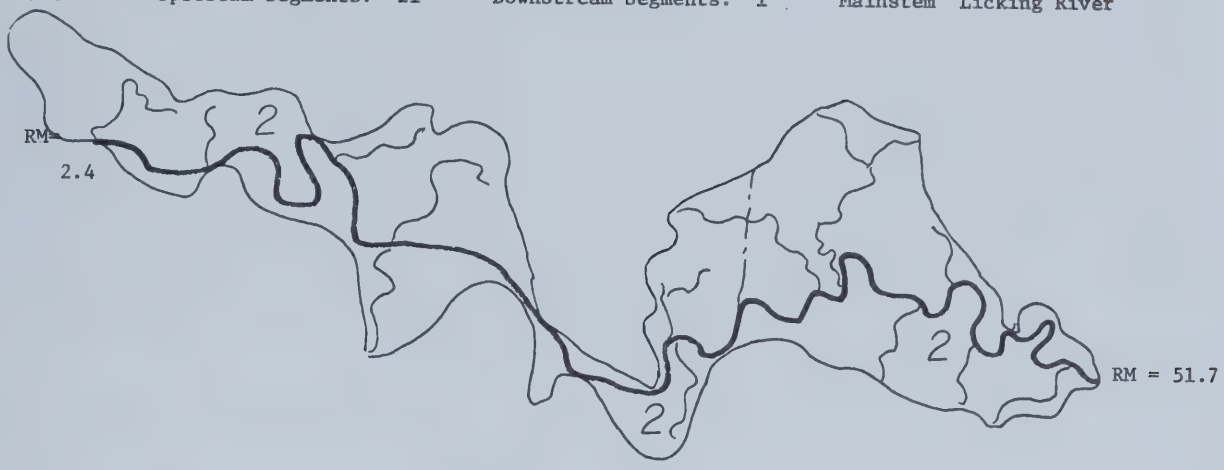
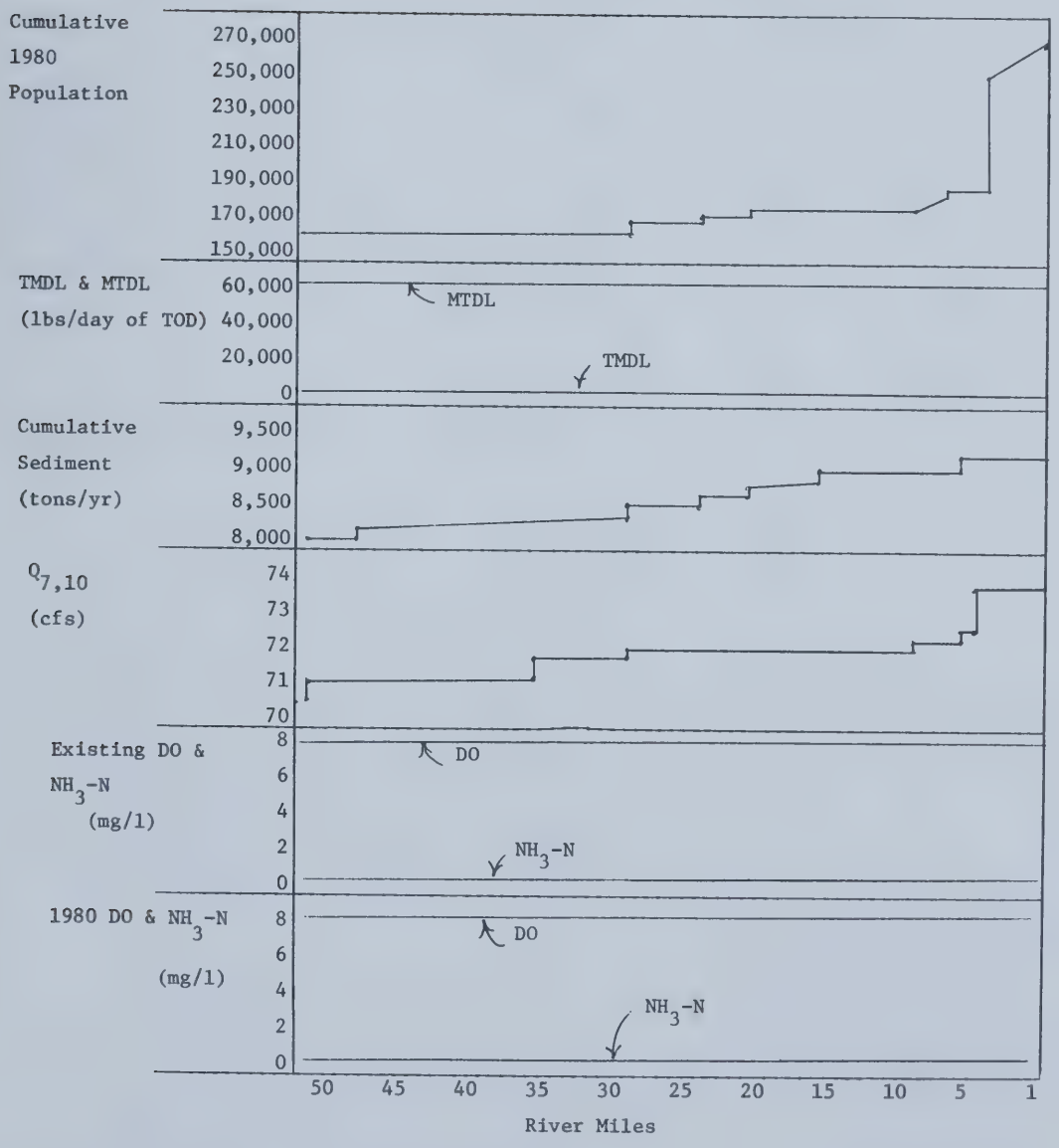


Exhibit B-2.1g (cont) Licking River Basin

Segment No. 2 Upstream Segments: 21 Downstream Segments: 1 Mainstem Licking River





SEGMENT NO. 3 ANALYSIS

Classification: WQL . Priority: 813.1

Description

The location of Segment No. 3 is shown in the Segment Map of Exhibit B-0. 2m , and Exhibit B-3 .1g. The former map shows the relative position of Segment No. 3 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 3 are listed in Exhibit B-3 .4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 3 (population, housing units, employment, and land use) are presented in Exhibit B- 3 .2t and profiles of 1980 data are presented in Exhibit B- 3 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Elsmere - Municipal - RM 0.8
- New Frontier Corp. - Domestic - RM 11.0
- Summit Hills - Domestic - RM 4.2
- Lakeside East Apartments - RM 3.9

This Segment encompasses 58 square miles of which 53.4 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-3.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 18.8) increases to 1.5 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 3 .1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 3 .3t) with which to document the historical record of standards contraventions in Segment 3 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 3 are listed and characterized in Exhibit B- 3 .4t. The total waste flows from the point sources is 1.1 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 3.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 3 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 3 .5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (237.7 lb/day of TOD) is compared with the maximum theoretical load of 333 lb/day of TOD. The segment priority assigned to Segment 3 is 813.1.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 3 are presented in Exhibit B- 3.6t.

Segment Strategems

The estimated 7 day Q_{10} in Banklick Creek and all of its tributaries is derived primarily from the accumulated wastewater discharges of one municipal and 35 domestic sources. Although the TMDL is less than the MTDL, the multiplicity of discharges and the proposed 1980 waste load allocations for these discharges (described in Exhibit B-3.5t) suggest the need for 201 Planning to evaluate sewer system and treatment plant alternatives, which aggregate the discharges of the expanding population. Alternatives to be considered include transport to the new Dry Creek Facility, or to the Licking River where considerable assimilative capacity is available.

Exhibit B-3.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 3 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	51567	57858	65393	90459
RURAL	5704	5556	5597	5066
FARM	1236	1206	1215	1101
NON-FARM	4468	4349	4382	3978
URBAN	45882	52302	59795	85380
HOUSING UNITS				
TOTAL	16461	18609	21254	30292
RURAL	1587	1570	1609	1527
URBAN	14873	17038	19644	28765
EMPLOYMENT				
TOTAL	11684	14405	17377	22416
MANUFACTURING	2196	2800	3540	4269
NON-MANUFACTURING	9487	11604	13836	18127
LAND USE				
TOTAL	57	57	57	57
RURAL	57	29	29	29
AGRICULTURE	43	23	23	23
SILVICULTURE	14	5	5	5
MINING	0	0	0	0
URBAN	0	28	28	28

Exhibit B-3.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l) Flow (mgd)	BOD	SS	NH_3
05035	Air-O-Flow Mfg. Plant	UT - Wolf Pen Br./Banklick Cr./Licking River 511.2/4.6/14.9/0.6/1.5	N.I.	Extended Aeration	0	0.001	25	30	6
05048	Lakewood Mobile Home Park	Lake Natural Dr. Lake/ UT - Banklick Cr. 511.2/4.6/14.62/2.6	N.I.	Extended Aeration	0	0.0064	40	40	10
05026	Crest Mobile Home Park	UT - Banklick Cr./Licking River 511.2/4.6/13.3/0.5	N.I.	Extended Aeration	0	0.0208	40	40	10
05050	St. Cecelia School	Pond/UT/Brushy Fk./ Banklick Cr. 511.2/4.6/11.0/3.0/0.52	N.I.	Extended Aeration	0	0.004	40	40	10
05028	New Frontier Corp.	UT - UT - Brushy Fk./ Banklick Cr./Licking River 511.2/4.6/11.0/1.7/0.3/0.3	N.I.	Extended Aeration	0	0.032	40	40	10
05029	Wood Dale	UT - Brush Fk./Banklick Cr./ Licking River 511.2/4.6/11.0/1.1/0.5	N.I.	Extended Aeration	0	0.0232	40	40	10
05021	Brookside Trailer Coach Park	Banklick Cr./Licking River 511.2/4.6/8.7	N.I.	Extended Aeration	.145	0.004	40	40	10
05036	Galloway Apt. Bldg.	Fowler Cr./Banklick Cr./ Licking River 511.2/4.6/8.3/6.7	N.I.	Extended Aeration	0	0.002	40	40	10
0503	Nixutil San. Association	Fowler Cr./Banklick Cr./ Licking River 511.2/4.6/8.3/6.3	N.I.	Extended Aeration	0	0.008	40	40	10
05043	Whites Tower Elementary School	UT - Fowler Cr./Banklick Cr./Licking River 511.2/4.6/8.3/5.6/0.25	N.I.	Extended Aeration	0	0.0064	40	40	10
05032	Twinhofel Jr. High School	UT - Fowler Cr./Banklick Cr./Licking River 511.2/4.6/8.3/5.6/0.2	N.I.	Extended Aeration	0	0.0131	40	40	10
05022	Highview Gardens Mobile Home Park	UT - Fowler Cr./Banklick Cr./Licking River 511.2/4.6/8.3/4.3/0.6	N.I.	Extended Aeration	0	0.0144	40	40	10
05025	Cherokee Acres Sub-division	Thompson Br./Fowler Cr./ Banklick Cr./Licking River 511.2/4.6/8.3/2.2/1.6	N.I.	Extended Aeration	0	0.012	40	40	10
05049	Oliver Hgts. Sewage Co.	Thompson Br./Fowler Cr./ Banklick Cr./Licking River 511.2/4.6/8.3/2.2/1.25	N.I.	Extended Aeration	.021	0.008	40	40	10
05041	Bavarian Trucking Co.	UT - Fowler Cr./Banklick Cr./Licking River 511.2/4.6/8.3/0.6/0.3	N.I.	Extended Aeration	0	0.0012	40	40	10
05034	First Baptist Church Chil-drens Home & Parsonage	Fowler Cr./Banklick Cr./ Licking River 511.2/4.6/8.3/0.1	N.I.	Extended Aeration	.108	0.009	40	40	10
05027	Bahama Gardens	UT - Wayman Br./Banklick Cr./Licking River 511.2/4.6/7.4/0.3/0.4	N.I.	Extended Aeration	0	0.0024	40	40	10
05046	Lifetime Phone, Inc.	UT - Bullock Pen/Banklick Cr./Licking River 511.2/4.6/6.8/3.23/2.65	N.I	Extended Aeration & Tertiary Sand Filter	0	0.008	10	10	6
05047	Elsmere Municipal STP	Bullock Pen Cr./Banklick Cr./Licking River 511.2/4.6/6.8/3.8	0020991	Trickling Filter	0	0.65	40	40	20
05053	Kenton Co. Golf Course	Doe Run/Bullock Pen Cr./ Banklick Cr./Licking River 511.2/4.6/6.8/1.25	0022098	Extended Aeration	0	0.0020	40	40	10
05018	Summit Hills Heights	UT - Banklick Cr./ Licking River 511.2/4.6/6.3/0.3	N.I.	Extended Aeration	0	0.008	40	40	10
05038	Taylor Mill Municipal Bldg.	Holds Br./Banklick Cr./ Licking River 511.2/4.6/5.5/2.8	N.I.	Extended Aeration	0	0.0007	40	40	10

Exhibit B-3.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05024	Greenbriar Apartments	UT - Holds Br./Banklick Cr./Licking River 511.2/4.6/5.5/1.96/0.5	N.I.	Extended Aeration	0	0.028	40	40	10
05020	Main. Barn Sanfordtown	Banklick Cr./Licking River 511.2/4.6/5.4	0025607	Extended Aeration	1.215	0.0008	40	40	10
05019	Summit Hills Hgts. Sanitation Corp.	UT - Banklick Cr./ Licking River 511.2/4.6/4.2/0.3	N.I.	Extended Aeration	0	0.048	40	40	10
05042	St. Pious Elementary School	Horse Br./Banklick Cr./ Licking River 511.2/4.6/3.9/2.9	N.I.	Extended Aeration	0	0.0020	40	40	10
05051	Hindsdale Elementary School	Horse Br./Banklick Cr./ Licking River 511.2/4.6/3.9/2.55	N.I.	Extended Aeration	.003	0.010	40	40	10
05033	Dudley Park Elementary School	Horse Br./Banklick Cr./ Licking River 511.2/4.6/3.9/2.4	N.I.	Extended Aeration	.020	0.0096	40	40	10
05030	Turkey Foot Heights Subdivision	UT - UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.9/1.0/0.5/0.4	N.I.	Extended Aeration	0	0.0216	40	40	10
05052	Lakeside East Apartments	UT - Horse Br./Banklick Cr./Licking River	N.I.	Conven. Activated Sludge Secondary	0	0.07	30	30	20
05044	Redwood School	UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.9/1.0/1.0	N.I.	Extended Aeration	0	0.0008	40	40	10
05045	Diocesan Catholic Children's Home	UT - UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.4/0.8/0.4/0.2	N.I.	Extended Aeration	.124	0.0050	40	40	10
05047	Co. Dog Pound	UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.9/0.4/0.35	N.I.	Extended Aeration	0	0.0025	40	40	10
05037	Standard Serv. Station Ft. Wright	UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.9/0.2/2.15	N.I.	Extended Aeration	0	0.0008	40	40	10
05040	Ashland Oil Co. Station	UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.9/0.24/2.0	N.I.	Extended Aeration	0	0.0008	40	40	10
05023	Sycamore Hills Trailer Park	UT - Horse Br./Banklick Cr./Licking River 511.2/4.6/3.9/0.2/0.1	N.I.	Extended Aeration	0	0.0096	40	40	10
05039	Walt's Hitching Post	UT - Banklick Cr./Licking River 511.2/4.6/2.5/0.16	N.I.	Extended Aeration	0	0.0040	40	40	10

Exhibit B-3.5t - Waste Load Allocations(1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05035	Air-O-Flow Mfg. Plant	0.08 BOD	0.001	10/95%	10/96%	1/96%	8	--------
05048	Lakewood Mobile Home Park	0.60 BOD	0.0072	10/95%	10/96%	1/96%	8	--------
05026	Crest Mobile Home Park	1.95 BOD	0.0234	10/95%	10/96%	1/96%	8	--------
05050	St. Cecelia School	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05028	New Frontier Corp.	3.00 BOD	0.036	10/95%	10/96%	1/96%	8	--------
05029	Wood Dale	1.80 BOD	0.0261	10/95%	10/96%	1/96%	8	--------
05021	Brookside Trailer Coach Park	1.13 BOD	0.0045	30/85%	30/88%	20/20%	4	--------
05036	Galloway Apt. Bldg.	0.17 BOD	0.002	10/95%	10/96%	1/96%	8	--------
05031	Nixutil San. Association	0.75 BOD	0.009	10/95%	10/96%	1/96%	8	--------
05043	Whites Tower Elementary School	0.60 BOD	0.0072	10/95%	10/96%	1/96%	4	--------
05032	Twinhofel Jr. High School	1.23 BOD	0.0147	10/95%	10/96%	1/96%	8	--------
05022	Highview Gardens Mobile Home Park	1.35 BOD	0.0162	10/95%	10/96%	1/96%	8	--------
05025	Cherokee Acres Subdivision	1.13 BOD	0.0135	10/95%	10/96%	1/96%	8	--------
05049	Oliver Hgts. Sewage Co.	0.75 BOD	0.009	10/95%	10/96%	1/96%	4	--------
05041	Bavarian Trucking Co.	0.11 BOD	0.0013	10/95%	10/96%	1/96%	8	--------
05034	First Baptist Church Childrens Home & Parsonage	2.50 BOD	0.010	30/85%	30/88%	20/20%	4	--------
05027	Bahama Gardens	2.25 BOD	0.027	10/95%	10/96%	1/96%	8	--------
05046	Lifetime Phone, Inc.	0.75 BOD	0.009	10/95%	10/96%	1/96%	8	--------
05017	Elsmere Municipal STP	72.56 BOD	0.87	10/95%	10/96%	1/96%	8	2121.4 Aa
05053	Kenton Co. Golf Course	0.21 BOD	0.0025	10/95%	10/96%	1/96%	8	--------
05018	Summit Hills Heights	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05038	Taylor Mill Municipal Bldg.	0.06 BOD	0.0007	10/95%	10/96%	1/96%	8	--------
05024	Greenbriar Apartments	2.63 BOD	0.0315	10/95%	10/96%	1/96%	8	--------
05020	Main. Barn Sanfordtown	0.23 BOD	0.0009	30/85%	30/88%	20/20%	4	--------
05019	Summit Hills Hgts. Sanitation Corp.	4.50 BOD	0.054	10/95%	10/96%	1/96%	8	--------
05042	St. Pious Elementary School	0.18 BOD	0.0022	10/95%	10/96%	1/96%	8	--------
05051	Hindsdale Elementary School	0.92 BOD	0.011	10/95%	10/96%	1/96%	4	--------
05033	Dudley Park Elementary School	0.90 BOD	0.0108	10/95%	10/96%	1/96	4	--------
05030	Turkey Foot Hgts. Subdivision	2.03 BOD	0.0243	10/95%	10/96%	1/96%	8	--------
05052	Lakeside East Apartments	6.67 BOD	0.08	10/95%	10/96%	1/96%	8	--------
05044	Redwood School	0.23 BOD	0.0009	30/85%	30/88%	20/20%	4	--------
05045	Diocesan Catholic Children's Home	0.47 BOD	0.0056	10/95%	10/96%	1/96%	8	--------

Exhibit B-3.5t - Waste Load Allocations(1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH3 (mg/l)	DO (mg/l)	
05047	Co. Dog Pount	0.21 BOD	0.0025	10/95%	10/96%	1/96%	8	--------
05037	Standard Serv. Station Ft. Wright	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05040	Ashland Oil Co. Station	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05023	Sycamore Hills Trailer Park	0.90 BOD	0.0109	10/95%	10/96%	1/96%	8	--------
05039	Walt's Hitching Post	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
	Segment 3	113.85 BOD						813.1

Exhibit B-3.6t - Municipal Needs - Licking River Basin

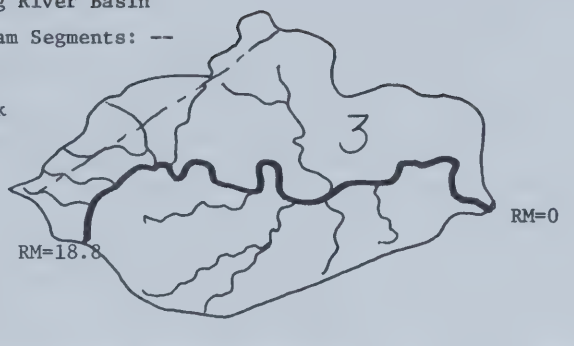
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05017	Elsmere			1977
	Treatment	T4B	1,111,000	
	Collectors	N.A.	488,000	
	Infiltration & Inflow	N.A.	508,000	

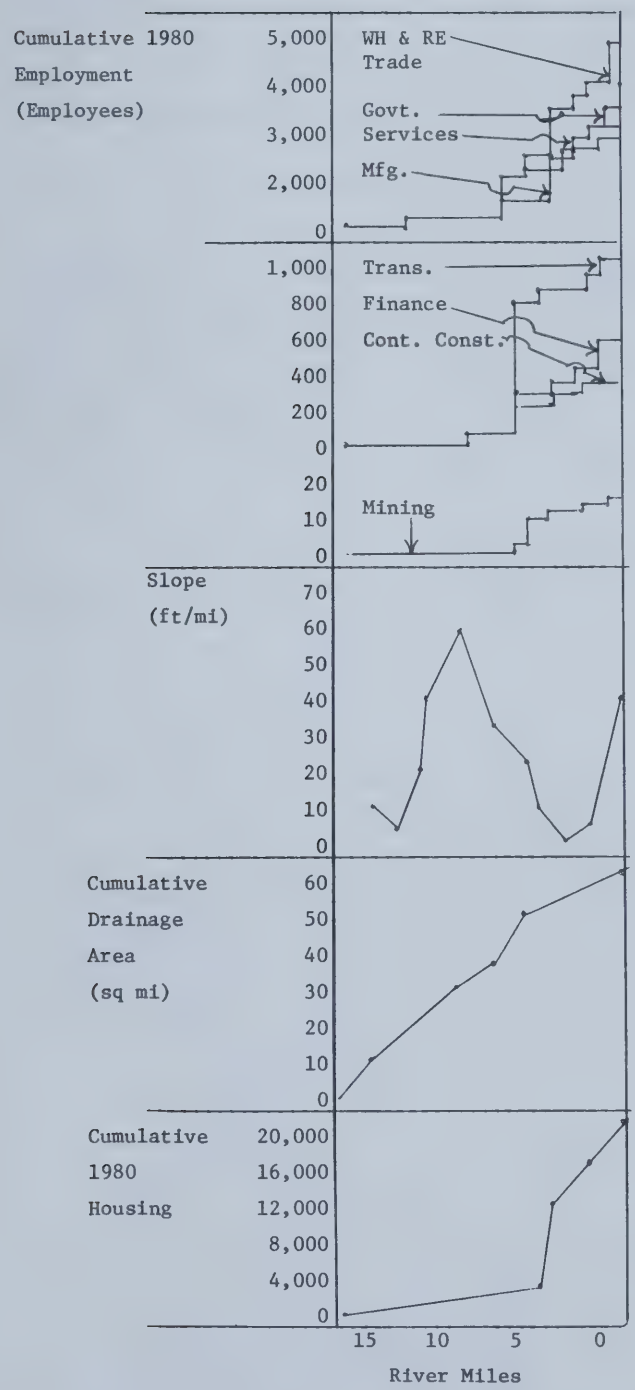
Exhibit B-3.1g Licking River Basin

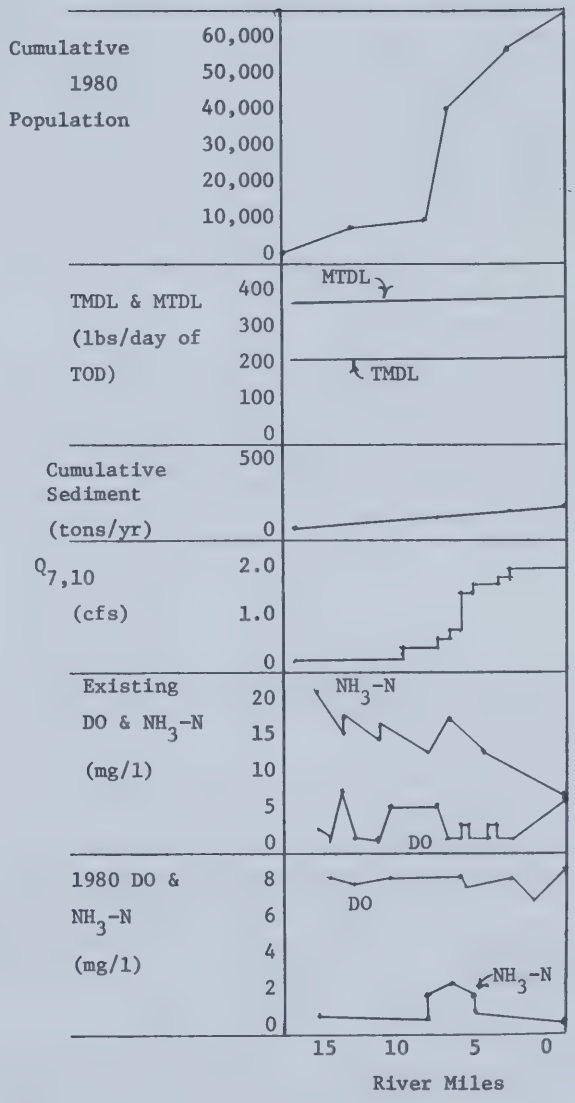
Segment No. 3 Upstream Segments: --

Downstream Segment: 2

Mainstem: Banklick Creek







SEGMENT NO. 4 ANALYSIS

Classification: WQL **Priority:** 118.7

Description

The location of Segment No. 4 is shown in the Segment Map of Exhibit B-0.2m , and Exhibit B- 4 .1g. The former map shows the relative position of Segment No. 4 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 4 is listed in Exhibit B- 4.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 4 (population, housing units, employment, and land use) are presented in Exhibit B- 4 .2t and profiles of 1980 data are presented in Exhibit B- 4.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 9 square miles of which 44.4 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-4.1.g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 7.0) increases to .136 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 4.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 4.3t) with which to document the historical record of standards contraventions in Segment 4.

Point and Nonpoint Source Discharges

The point source discharge in Segment 4 is listed and characterized in Exhibit B- 4.4t. The total waste flows from the point source is .023 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 4.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 4.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (4.3 1b/day of TOD) is compared with the maximum theoretical load of 19 1b/day of TOD. The segment priority assigned to Segment 4 is 118.7.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 4 are presented in Exhibit B- 4.6t.

Segment Strategems

As shown by the profiles in Exhibit B-4.1g, the waste discharge impacts in the DeCoursey Creek Basin increase as one proceeds northward into the Northern Kentucky Metropolitan Area and to the City of Taylor Mill. The need for central sewerage facilities in Taylor Mill and contiguous areas has been expressed by both local and State officials and is being addressed through the Intensive 201 Planning Process underway in Taylor Mill. The available assimilative capacity of the Licking River should be an important determinant in facilities planning for the DeCoursey Creek Basin.

Exhibit B-4.2t

LICKING RIVER BASIN

SEGMENT 4 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	2894	3206	3623	4909
RURAL	2242	2194	2206	2064
FARM	470	460	463	433
NON-FARM	1771	1733	1742	1631
URBAN	652	1011	1417	2844
HOUSING UNITS				
TOTAL	808	907	1042	1473
RURAL	618	613	628	614
URBAN	189	293	414	858
EMPLOYMENT				
TOTAL	150	260	395	750
MANUFACTURING	25	46	75	137
NON-MANUFACTURING	125	214	320	613
LAND USE				
TOTAL	9	9	9	9
RURAL	9	7	7	7
AGRICULTURE	7	5	5	5
SILVICULTURE	1	1	1	1
MINING	0	0	0	0
URBAN	0	1	1	1

Exhibit B-4.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05054	St. Patricks Parrish	UT - Decoursey Cr./ Licking River 511.2/6.3/6.1/0.9	N.I.	Extended Aeration	0	0.0016	40	40	10
05055	Ryland Hgts. Elementary School	UT - Decoursey Cr./ Licking River 511.2/6.3/5.24/0.2	N.I.	Extended Aeration	0	0.0054	40	40	10
05056	Jefferson Place	UT - Decoursey Cr./ Licking River 511.2/6.3/1.6/0.6	N.I.	Extended Aeration	0	0.016	40	40	10

Exhibit B-4.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05054	St. Patricks Parrish	0.15 BOD	0.0018	10/95%	10/96%	1/96%	8	--------
05055	Ryland Hgts. Elementary School	0.50 BOD	0.0060	10/95%	10/96%	1/96%	8	--------
05056	Jefferson Place	1.50 BOD	0.018	10/95%	10/96%	1/96%	8	--------
	Segment 4	2.15 BOD						118.7

Exhibit B-4.6t - Municipal Needs - Licking River Basin

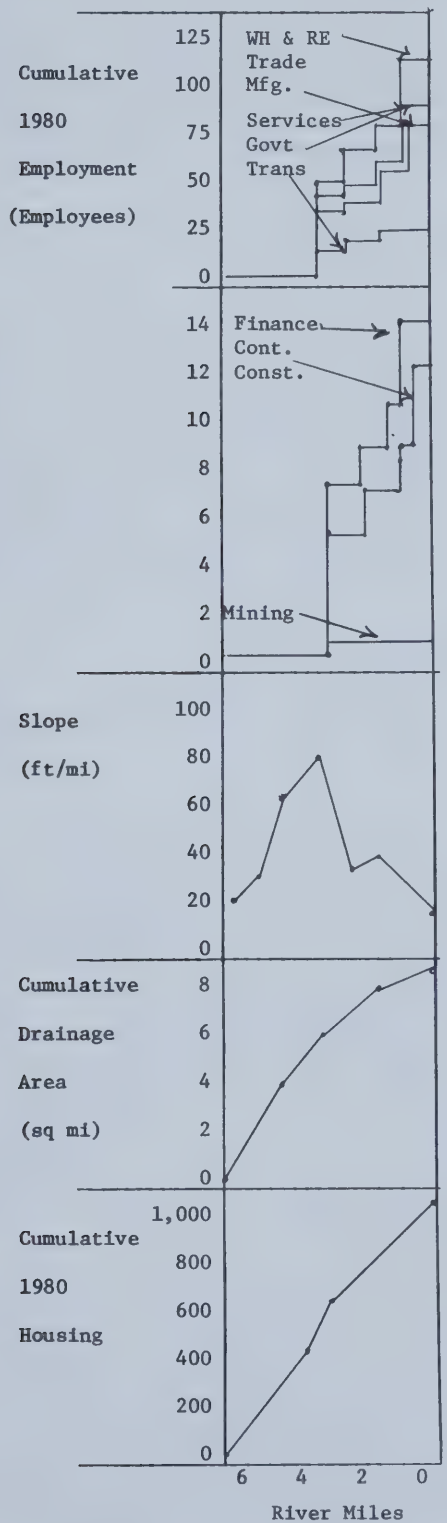
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05---	Taylor Mill	T1A		1977
	Collectors	N.A.	2,062,000	

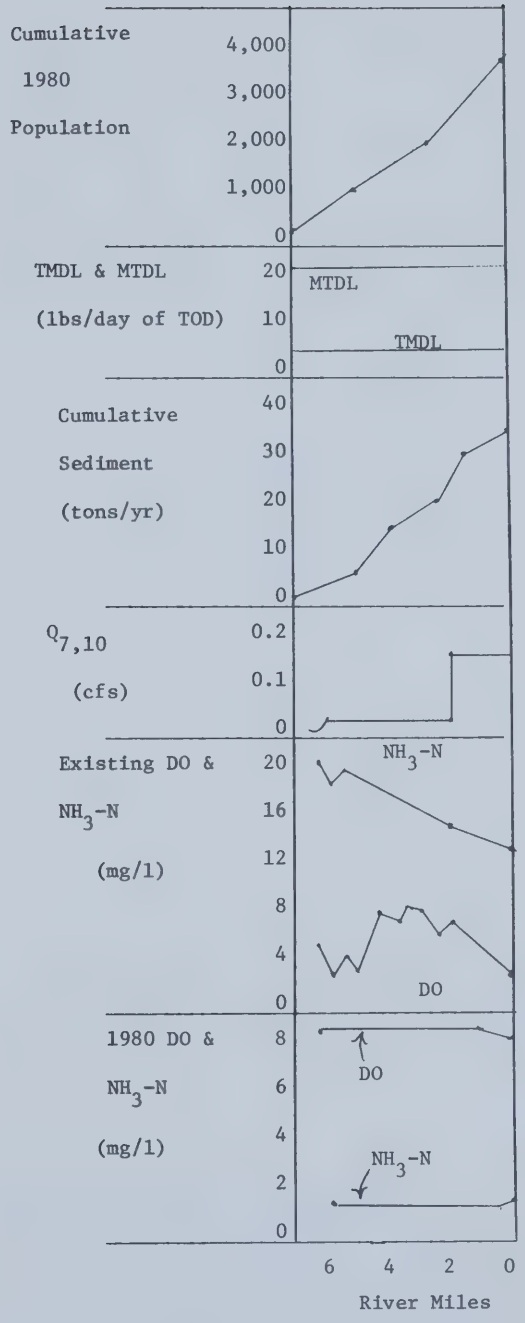
Exhibit B-4.1g Licking River Basin

Segment No. 4 Upstream Segments: 00

Downstream Segment: 2

Mainstem: De Coursey Creek





SEGMENT NO. 5 ANALYSIS

Classification: WQL Priority: 102.0

Description

The location of Segment No. 5 is shown in the Segment Map of Exhibit B-0.2m , and Exhibit B-5 .1g. The former map shows the relative position of Segment No. 5 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 5 is listed in Exhibit B- 5.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 5 (population, housing units, employment, and land use) are presented in Exhibit B- 5.2t and profiles of 1980 data are presented in Exhibit B- 5.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 4 square miles of which 50 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B- 5.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 3.8) increases to .002 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 5.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 5.3t) with which to document the historical record of standards contraventions in Segment 5.

Point and Nonpoint Source Discharges

The point source discharge in Segment 5 is listed and characterized in Exhibit B- 5.4t. The total waste flows from the point source is .001mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 5.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 5 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 5 .5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.22 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 5 is 102.0.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 5 are presented in Exhibit B- 5.6t.

Segment Strategems

The principal stream in Segment No. 5 is Riffle Creek which originates in the City of Alexandria and flows approximately four miles to the Licking River. Until very recently, this Segment contained several domestic point source discharges. Completion of the new Alexandria wastewater treatment facility has eliminated all but one of these discharges. When ongoing 201 Facilities Plans are completed, the appropriateness of incorporating Segment No. 5 into Segment No. 2 may also be indicated.

Exhibit B-5.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 5 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1057	1138	1211	1564
RURAL	674	687	663	645
FARM	159	162	156	152
NON-FARM	515	525	506	492
URBAN	383	450	548	919
HOUSING UNITS				
TOTAL	293	319	346	464
RURAL	184	190	186	187
URBAN	109	129	160	277
EMPLOYMENT				
TOTAL	73	102	140	244
MANUFACTURING	15	21	30	49
NON-MANUFACTURING	57	80	109	194
LAND USE				
TOTAL	4	4	4	4
RURAL	4	3	3	3
AGRICULTURE	4	3	3	3
SILVICULTURE	0	0	0	0
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-5.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05057	Higdon's Mobile Village #2	UT - Riffle Cr./ Licking River 511.2/13.9/1.2/0.4	N.I.	Extended Aeration	0	0.0012	40	40	10

Exhibit B-5.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05057	Higdon's Mobile Village #2	0.11 BOD	0.0013	10/95%	10/96%	1/96%	8	--------
	Segment 5	0.11 BOD						102.0

Exhibit B-5.6t - Municipal Needs - Licking River Basin

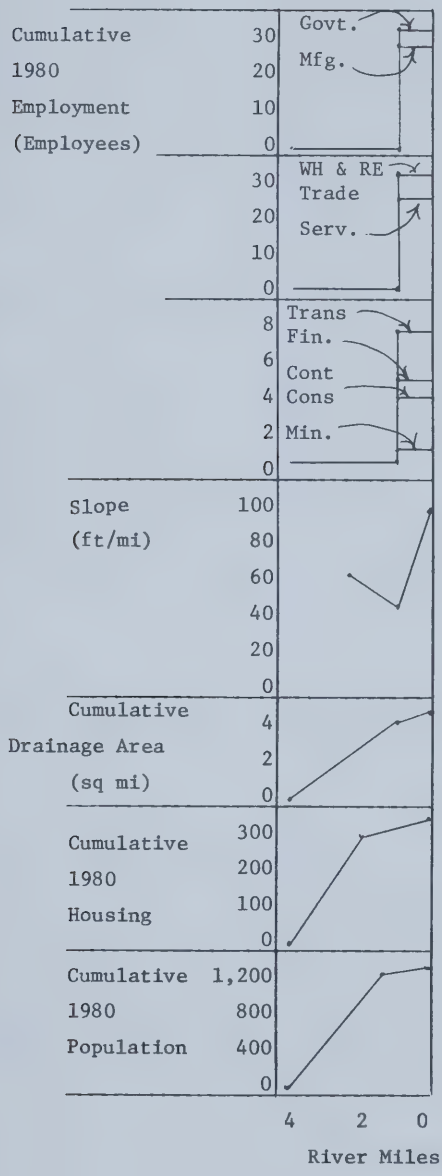
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

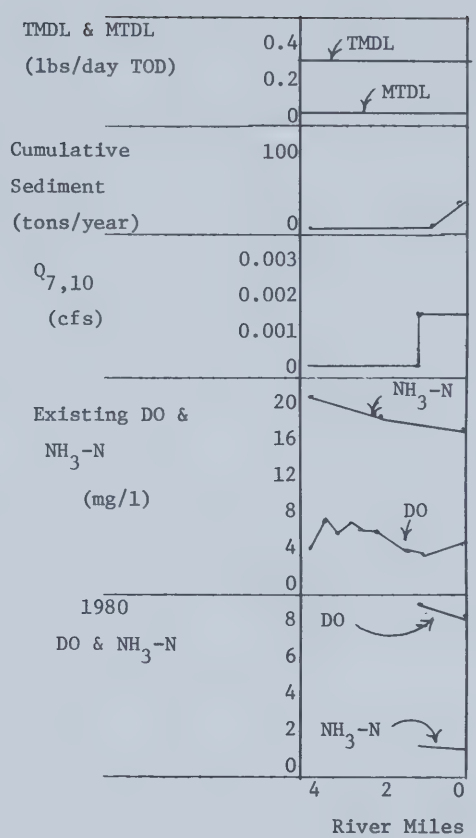
Exhibit B-5.1g Licking River Basin

Segment No. 5 Upstream Segments: --

Downstream Segment: 2

Mainstem: Riffle Creek RM = 0





SEGMENT NO. 6 ANALYSIS

Classification: EL Priority: 102.2

Description

The location of Segment No. 6 is shown in the Segment Map of Exhibit B-0.2m , and Exhibit B-6 .1g. The former map shows the relative position of Segment No. 6 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 6 is listed in Exhibit B- 6.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 6 (population, housing units, employment, and land use) are presented in Exhibit B- 6.2t and profiles of 1980 data are presented in Exhibit B- 6.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 13 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-6.1.g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 8.3) increases to .002 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 6.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 6 .3t) with which to document the historical record of standards contraventions in Segment 6 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 6 is listed and characterized in Exhibit B- 6 .4t. The total waste flows from the point source is .001 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 6 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 6.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 6 is 102.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 6 are presented in Exhibit B- 6.6t.

Segment Strategems

Considerations of the data in Exhibit B-6.5t and the profiles of the impacts of this discharge, on the DO and NH_3-N concentrations in the main stem (Exhibit B-6.1g) indicate that there is little capacity to accomodate wastewater discharges in the Bowman Creek Drainage Basin. Thus, urbanization spreading into the Segment from the Northern Kentucky Metropolitan Area may generate water quality management problems in Segment No. 6.

Exhibit B-6.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 6 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1387	1308	1327	1091
RURAL	1387	1308	1327	1091
FARM	291	274	278	229
NON-FARM	1096	1033	1048	862
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	412	394	407	350
RURAL	412	394	407	350
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	12	12	12	12
RURAL	12	12	12	12
AGRICULTURE	7	7	7	7
SILVICULTURE	5	5	5	5
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-6.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05058	Big Jack's Drive-In	UT - Bowman Cr./ Licking River 511.2/21.2/5.89/2.1	N.I.	Extended Aeration	0	0.0014	40	40	10

Exhibit B-6.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05058	Big Jack's Drive-In	0.13 BOD	0.0016	10/95%	10/96%	1/96%	8	--------
	Segment 6	0.13 BOD						102.2

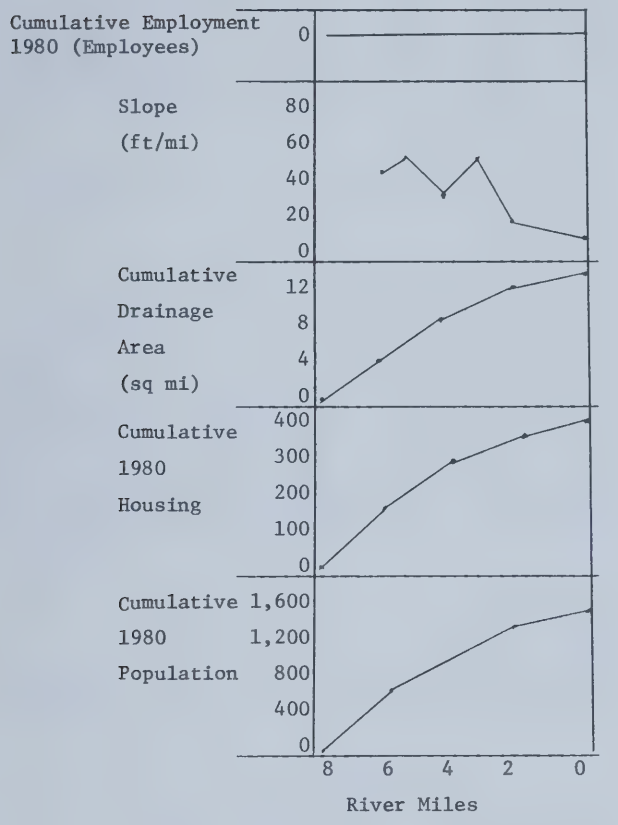
Exhibit B-6.6t - Municipal Needs - Licking River Basin

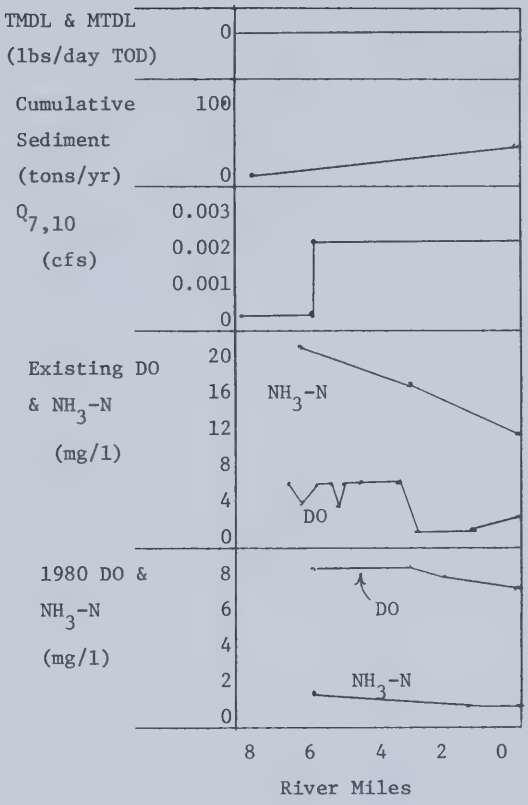
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

Exhibit B-6.1g Licking River Basin

Segment No. 6 Upstream Segments: --

Downstream Segment: 2 Mainstem: Bowmman Creek





SEGMENT NO. 7 ANALYSIS

Classification: WQL Priority: 107.9

Description

The location of Segment No. 7 is shown in the Segment Map of Exhibit B-0.2m , and Exhibit B- 7 .1g. The former map shows the relative position of Segment No. 7 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 7 is listed in Exhibit B- 7.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 7 (population, housing units, employment, and land use) are presented in Exhibit B- 7.2t and profiles of 1980 data are presented in Exhibit B- 7 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. None

This Segment encompasses 33 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B- 7.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 13.3) increases to .011 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 7.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 7.3t) with which to document the historical record of standards contraventions in Segment 7 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 7 is listed and characterized in Exhibit B- 7.4t. The total waste flows from the point source is .008 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 7.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 7 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 7.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (1.15 lb/day of TOD) is compared with the maximum theoretical load of 1 lb/day of TOD. The segment priority assigned to Segment 7 is 107.9.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 7 are presented in Exhibit B- 7.6t.

Segment Strategems

Segment No. 7 lies along the southern boundary of the Northern Kentucky Metropolitan Area with the headwaters of Cruises Creek in the City of Walton. Although this Segment is basically agricultural, some population, housing and employment impacts exist as shown on Exhibit B-7.1g. A comparison of the TMDL and MTDL for Cruises Creek shows that there is a minimum of excess assimilative capacity in the Segment. With reference to the ongoing 201 Facilities Program for the City of Walton, the limited remaining assimilative capacity suggests a need to evaluate wastewater management alternatives which incorporate discharges to other segments.

Exhibit B-7.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 7 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	2370	2369	2685	9552
RURAL	1848	1650	1699	7771
FARM	391	349	359	1661
NON-FARM	1457	1301	1339	5889
URBAN	522	718	986	1781
HOUSING UNITS				
TOTAL	714	728	842	3182
RURAL	548	497	520	2579
URBAN	165	231	321	602
EMPLOYMENT				
TOTAL	369	417	481	2219
MANUFACTURING	104	117	135	494
NON-MANUFACTURING	264	299	346	1725
LAND USE				
TOTAL	32	32	32	32
RURAL	32	32	32	32
AGRICULTURE	23	23	23	23
SILVICULTURE	9	9	9	9
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-7.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05061	Truett-De-moisey Bldg.	UT - Cruises Cr./ Licking River 511.2/24.5/13.45/0.4	N.I.	Extended Aeration	0	0.0012	40	40	10
05062	U. S. Post Office	UT - Cruises Cr./ Licking River 511.2/24.5/13.45/0.45	N.I.	Extended Aeration	0	0.0005	40	40	10
05059	Durr Office Bldg.	UT - Cruises Cr./ Licking River 511.2/24.5/10.4/3.2	N.I.	Extended Aeration	0	0.0008	40	40	10
05060	Piner Elementary School	UT - Little Cruises/ Cruises Cr./Licking River 511.2/24.5/1.8/1.0/2.3	N.I.	Extended Aeration	0	0.0054	40	40	10

Exhibit B-7.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05061	Truett-Demoisey Bldg.	N.A.	-----	------	------	------	------	--------
05062	U. S. Post Office	N.A.	-----	------	------	------	------	--------
05059	Durr Office Bldg.	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05060	Piner Elementary School	0.50 BOD	0.0006	10/95%	10/96%	1/96%	8	--------
	Segment 7	0.58 BOD						107.9

Exhibit B-7.6t - Municipal Needs - Licking River Basin

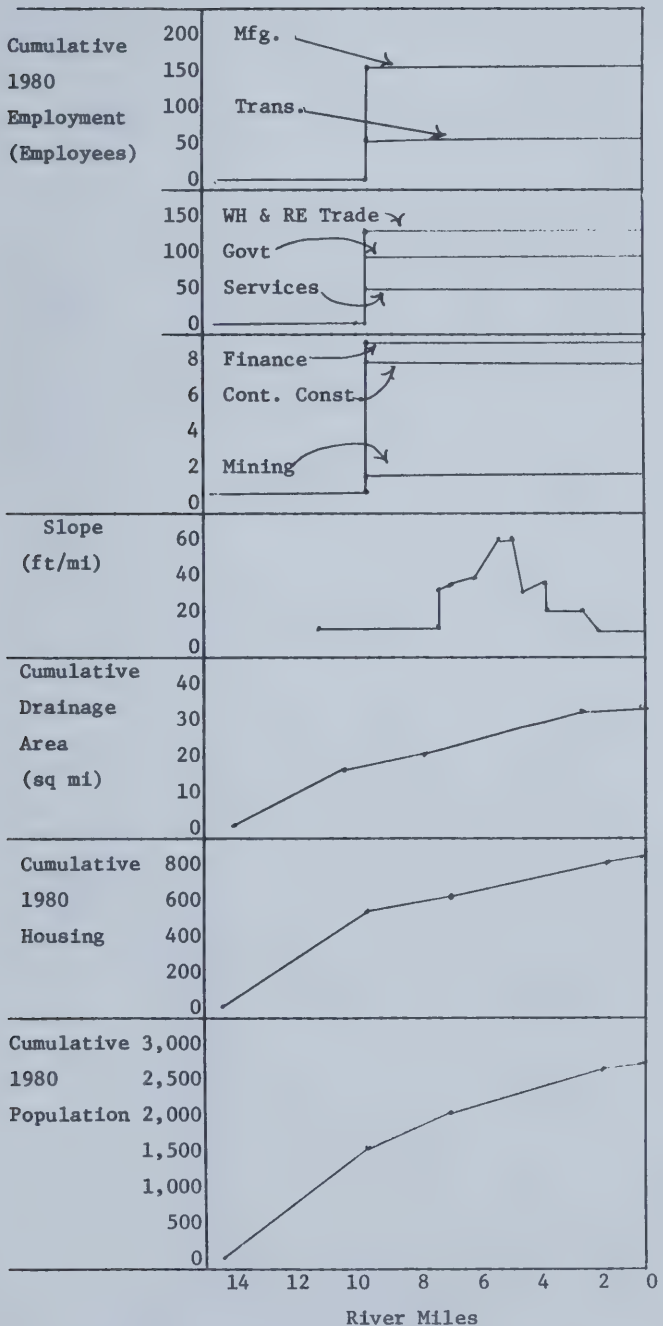
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

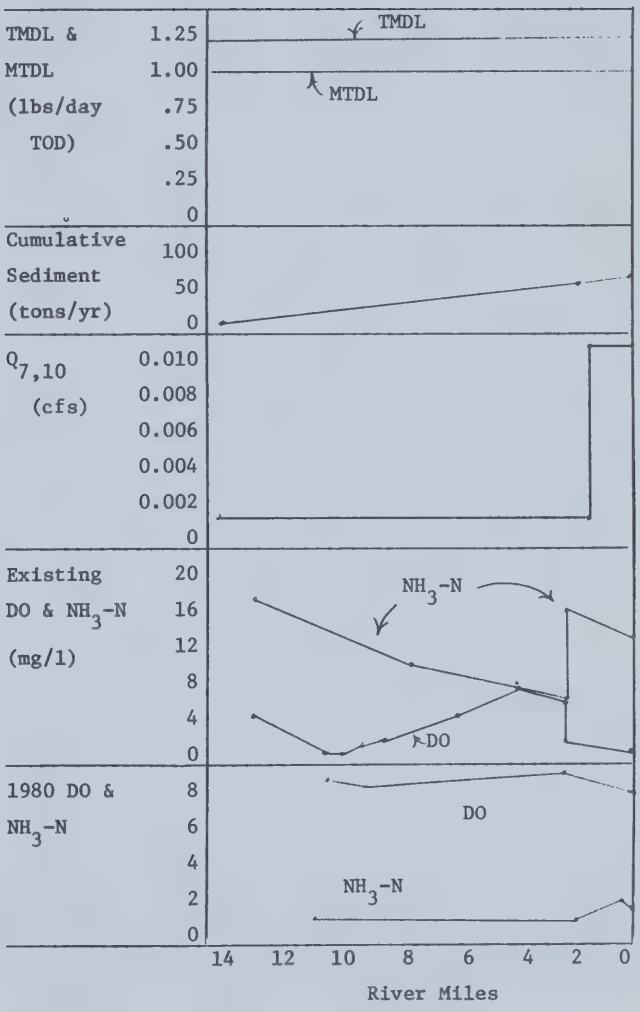
Exhibit B-7.1g Licking River Basin

Segment No. 7 Upstream Segments: --

Downstream Segment: 2

Mainstem: Cruises Creek





SEGMENT NO. 8 ANALYSIS

Classification: WQL Priority: 130.9

Description

The location of Segment No. 8 is shown in the Segment Map of Exhibit B-0.2m , and Exhibit B-8 .1g. The former map shows the relative position of Segment No. 8 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 8 is listed in Exhibit B- 8.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 8 (population, housing units, employment, and land use) are presented in Exhibit B- 8 .2t and profiles of 1980 data are presented in Exhibit B- 8 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 18 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B- 8.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 13.2) increases to .086 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 8.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 8.3t) with which to document the historical record of standards contraventions in Segment 8 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 8 is listed and characterized in Exhibit B- 8.4t. The total waste flows from the point source is .05 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 8.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 8.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (15.16 lb/day of TOD) is compared with the maximum theoretical load of 36 lb/day of TOD. The segment priority assigned to Segment 8 is 130.9.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 8 are presented in Exhibit B- 8.6t.

Segment Strategems

The upper portions of the Phillips Creek drainage area are under increasing pressure of development. It is apparent from the profile data in Exhibit B-8.1g, that the waste assimilation capacity in Segment No. 8 is rather limited. Thus, integrated water quality management planning at each stage of development is mandatory in the Segment. The relatively untapped assimilative capacity of the Licking River at its confluence with Phillips Creek should be considered in dealing with the waste treatment management problems of new development.

Exhibit B-8.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 8 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1095	1157	1045	961
RURAL	1095	1157	1045	961
FARM	256	273	246	226
NON-FARM	836	884	798	734
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	303	325	297	283
RURAL	303	325	297	283
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	17	17	17	17
RURAL	17	17	17	17
AGRICULTURE	12	12	12	12
SILVICULTURE	4	4	4	4
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-8.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05064	Campbell Co. Park	UT - Phillips Cr./ Licking River 511.2/27.4/8.7/0.1	N.I.	Extended Aeration	0	0.032	40	40	10
05011	Grants Lick Elementary School	Phillips Cr./Licking River 511.2/27.4/8.6	N.I.	Extended Aeration	0	0.008	40	40	10
05065	Jacob's Mobile Home Park	Phillips Cr./Licking River 511.2/27.4/8.3	N.I.	Extended Aeration	.70	0.0096	40	40	10

Exhibit B-8.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05064	Campbell County Park	3.00 BOD	0.036	10/95%	10/96%	1/96%	8	--------
05011	Grants Lick Elementary School	1.50 BOD	0.009	20/90%	20/92%	15/40%	4	--------
05065	Jacob's Mobile Home Park	0.90 BOD	0.0108	10/95%	10/96%	1/96%	·4	--------
	Segment 8	5.4 BOD						130.9

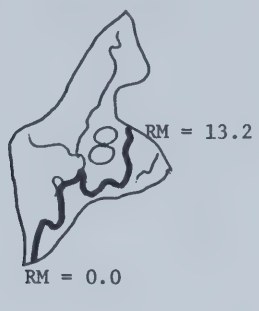
Exhibit B-8.6t - Municipal Needs - Licking River Basin

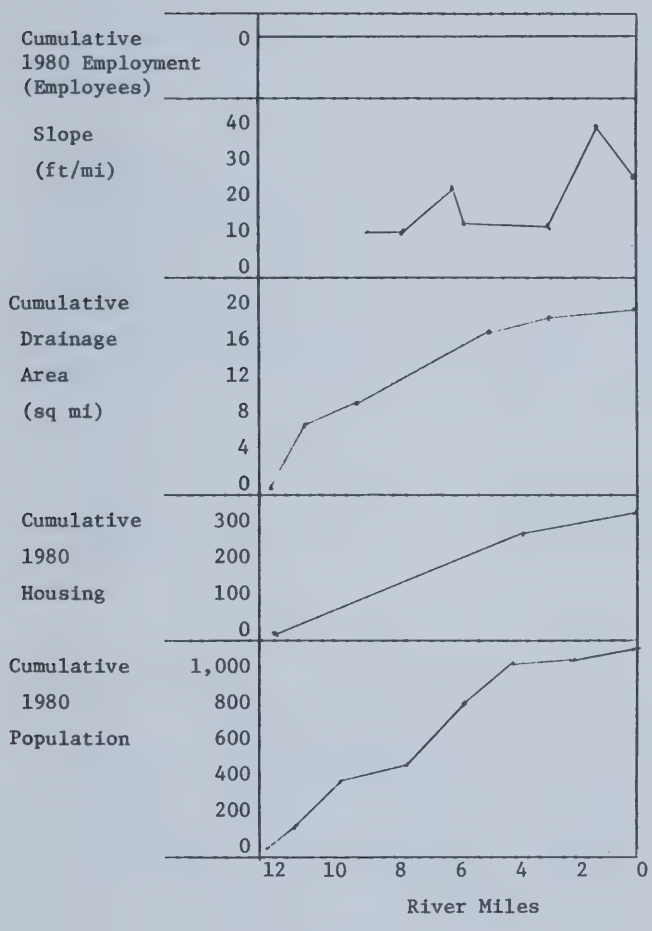
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

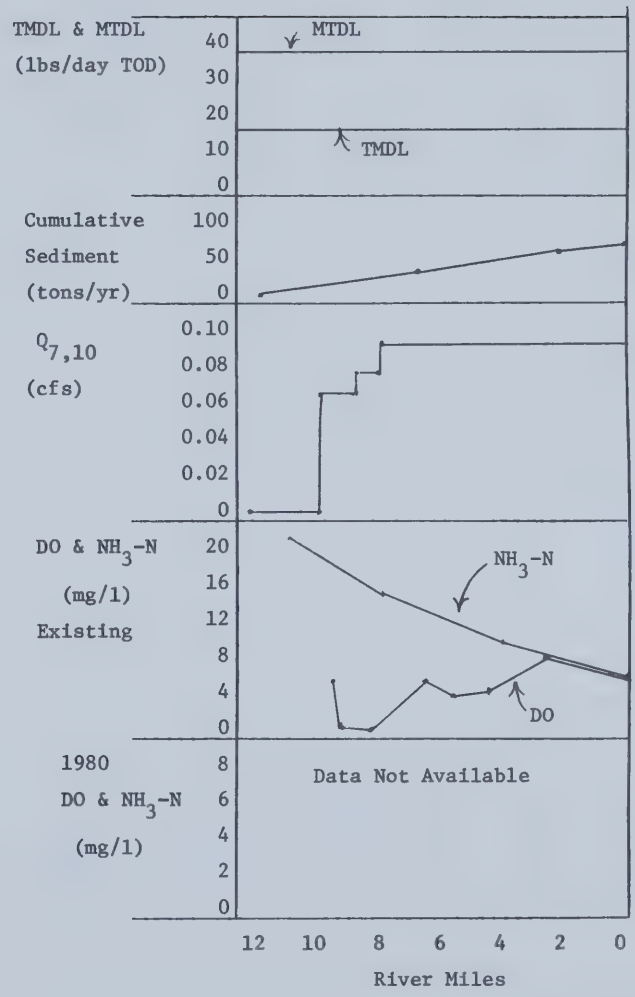
Exhibit B-8.1g Licking River Basin

Segment No. 8 Upstream Segments: --

Downstream Segment: 2 Mainstem: Phillips Creek







SEGMENT NO. 9 ANALYSIS

Classification: WQL Priority: 130.6

Description

The location of Segment No. 9 is shown in the Segment Map of Exhibit B-0.2m , and Exhibit B- 9 .1g. The former map shows the relative position of Segment No. 9 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 9 are listed in Exhibit B- 9.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 9 (population, housing units, employment, and land use) are presented in Exhibit B- 9.2t and profiles of 1980 data are presented in Exhibit B- 9 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Griffin Fertilizer - Industrial - RM 6.2

This Segment encompasses 121 square miles of which 2.4 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B- 9.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 26.7) increases to .09 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 9 .1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 9.3t) with which to document the historical record of standards contraventions in Segment 9

Point and Nonpoint Source Discharges

The point source discharges in Segment 9 are listed and characterized in Exhibit B- 9.4t. The total waste flows from the point source is .06 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 9.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 9 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 9.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (10.6 lb/day of TOD) is compared with the maximum theoretical load of 21 lb/day of TOD. The segment priority assigned to Segment 9 is 130.6.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 9 are presented in Exhibit B- 9.6t.

Segment Strategems

The Cities of Williamstown and Crittenden are located at the headwaters of Segment No. 9. 201 Facilities Plans are to be developed for both areas. As shown by the profiles in Exhibit B-9.1g, the assimilative capacity in all three forks of Grassy Creek is rather limited. Thus, based on these initial analyses, the municipal discharges from Williamstown or Crittenden into Segment No. 9 will require high degrees of BOD and NH_3-N removal if current water quality standards are to be maintained.

Exhibit B-9.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 9 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	5456	5479	5650	6006
RURAL	4034	3967	4024	4070
FARM	2224	2221	2247	2402
NON-FARM	1809	1745	1776	1668
URBAN	1421	1512	1626	1936
HOUSING UNITS				
TOTAL	2024	2085	2204	2557
RURAL	1497	1509	1566	1741
URBAN	527	575	638	815
EMPLOYMENT				
TOTAL	588	654	720	823
MANUFACTURING	57	73	92	109
NON-MANUFACTURING	530	580	628	714
LAND USE				
TOTAL	121	121	121	121
RURAL	119	118	116	116
AGRICULTURE	87	86	86	86
SILVICULTURE	32	32	32	32
MINING	0	0	0	0
URBAN	1	2	2	2

Exhibit B-9.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05067	Smith's Nursing Home	Townsend Br./Middle Fk. Grassy/Grassy Cr./Licking River 511.2/30.6/1.4/13.25/3.5	N.I.	Extended Aeration	0	0.0032	40	40	10
05066	Stampler Mobile Home Park	Middle Fk. Grassy/Grassy Cr./Licking River 511.2/30.6/1.4/15.6	N.I.	Extended Aeration	0	0.011	40	40	10
05068	Griffin Fertilizer	UT - UT - S. Fk. Grassy Cr./Licking River 511.2/30.6/6.2/1.0/0.7	N.I.	Lagoon	0	0.05	50	40	20

Exhibit B-9.5T - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05067	Smith's Nursing Home	0.30 BOD	0.0036	10/95%	10/96%	1/96%	8	--------
05066	Stampler Mobile Home Park	0.83 BOD	0.0099	10/95%	10/96%	1/96%	8	--------
05068	Griffin Fertilizer	4.17 BOD	0.05	10/95%	10/96%	1/96%	8	--------
	Segment 9	5.3 BOD						130.6

Exhibit B-9.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

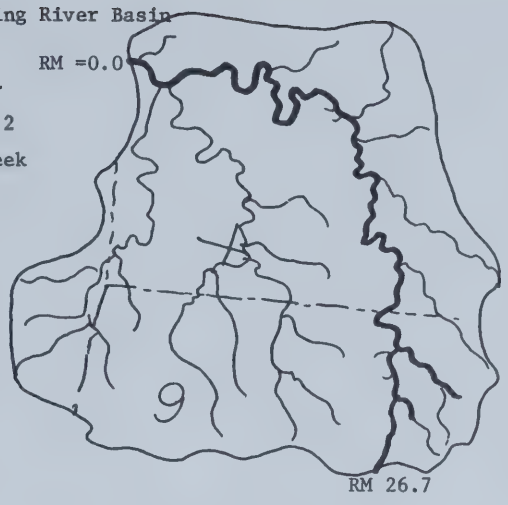
Exhibit B-9.1g Licking River Basin

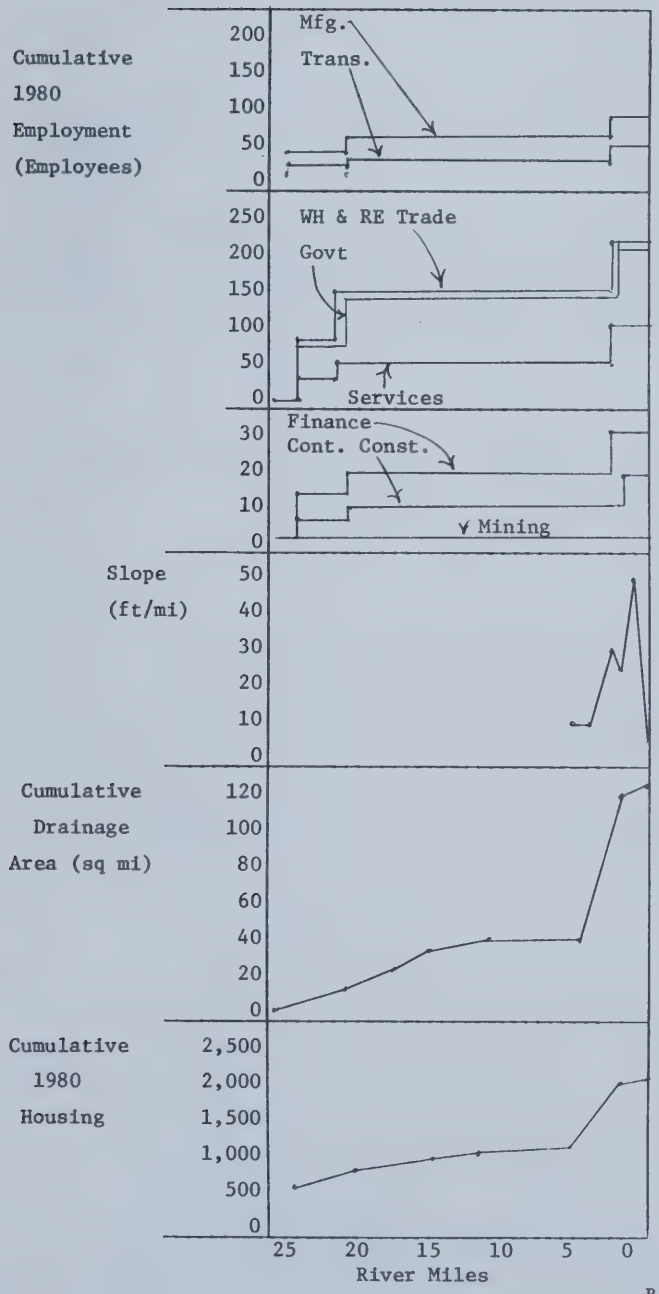
Segment No. 9

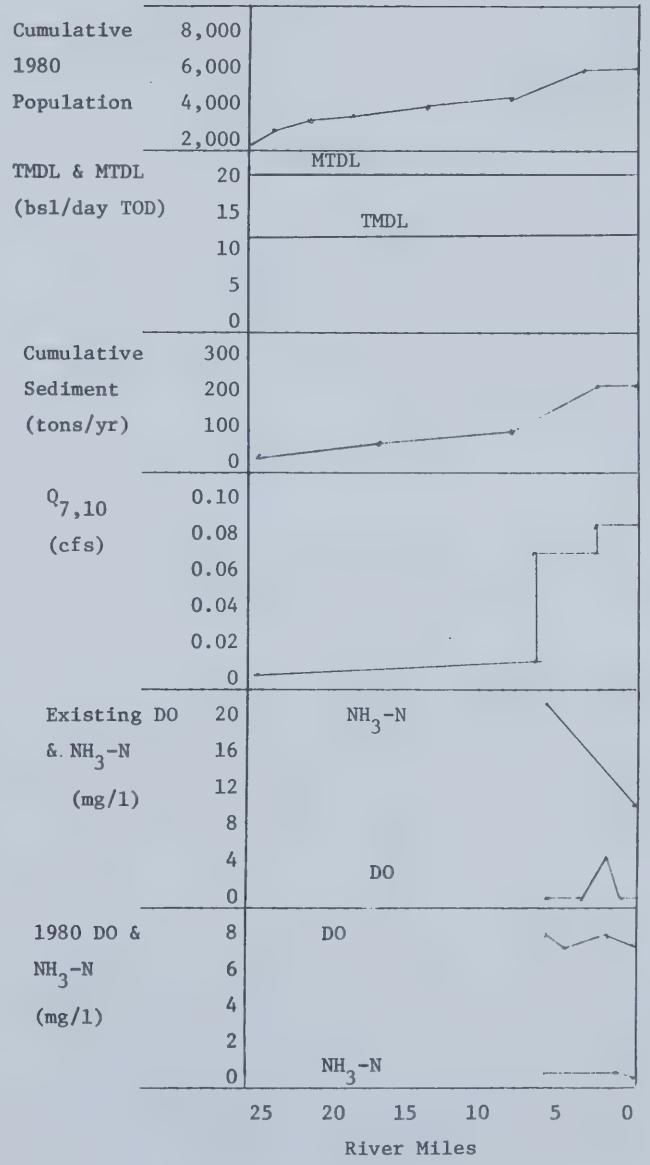
Upstream Segments: --

Downstream Segment: 2

Mainstem: Grassey Creek







SEGMENT NO. 10 ANALYSIS

Classification: WQL Priority: 113.8

Description

The location of Segment No. 10 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-10 .1g. The former map shows the relative position of Segment No. 10 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 10 is listed in Exhibit B-10.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 10 (population, housing units, employment, and land use) are presented in Exhibit B- 10.2t and profiles of 1980 data are presented in Exhibit B- 10.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 47 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-10.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM16.9) increases to .035 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B-10 .1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 10.3t) with which to document the historical record of standards contraventions in Segment 10.

Point and Nonpoint Source Discharges

The point source discharge in Segment 10 is listed and characterized in Exhibit B-10 .4t. The total waste flows from the point source is .02 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 10.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 10 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 10.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (3.67 lb/day of TOD) is compared with the maximum theoretical load of 5 lb/day of TOD. The segment priority assigned to Segment 10 is 113.8.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 10 are presented in Exhibit B- 10.6t.

Segment Strategems

Segment No. 10 contains (in its lower reaches) a portion of the proposed Falmouth Lake project (Corps of Engineers). Should this project come to fruition, the waters of the downstream portion of the segment will be converted from a free flowing to a backwater condition. Thus, the positive benefit of downstream low flow augmentation that will accrue should this project be implemented will be countered by the increased levels of waste treatment management required for any discharges to the backwater system.

Exhibit B-10.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 10 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1006	1015	1029	1097
RURAL	1006	1015	1029	1097
FARM	603	609	617	657
NON-FARM	402	406	412	440
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	342	351	362	409
RURAL	342	351	362	409
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	46	46	46	46
RURAL	46	46	46	46
AGRICULTURE	33	33	33	33
SILVICULTURE	12	12	12	12
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-10.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05069	Kincaid Lake St. Park	Kincaid Cr./Licking River 511.2/46.5/2.35	N.I.	Extended Aeration	0	0.020	40	40	10

Exhibit B-10.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05069	Kincaid Lake State Park	1.83 BOD	0.022	10/95%	10/96%	1/96%	8	--------
	Segment 10	1.83 BOD						113.8

Exhibit B-10.6t - Municipal Needs - Licking River Basin

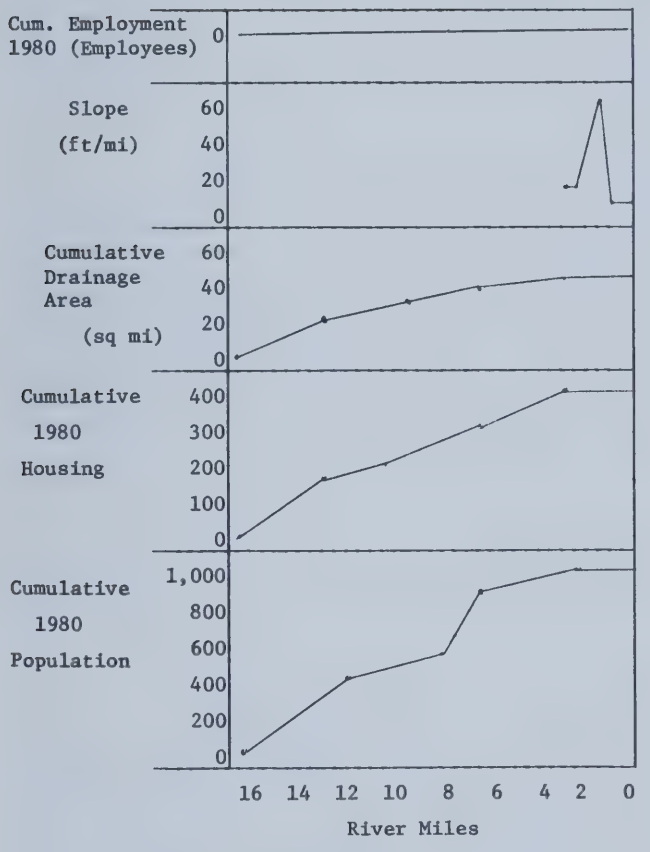
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

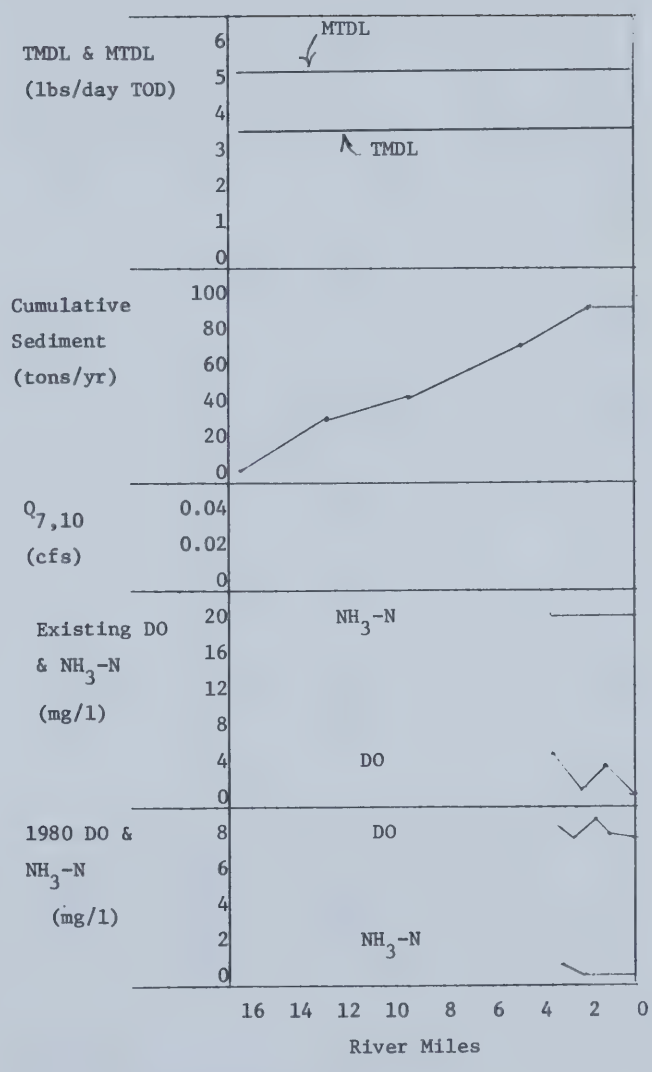
Exhibit B-10.1g Licking River Basin

Segment No. 10 Upstream Segments: --

Downstream Segment: 2

Kincaid Creek : Mainstem





SEGMENT NO. 11 ANALYSIS

Classification: EL Priority:109.5

Description

The location of Segment No. 11 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-11 .1g. The former map shows the relative position of Segment No. 11 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 11 is listed in Exhibit B-11.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 11 (population, housing units, employment, and land use) are presented in Exhibit B- 11.2t and profiles of 1980 data are presented in Exhibit B- 11.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

None

This Segment encompasses 187 square miles of which .5 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-11.1g. The 7 day Q_{10} flow of 12.6 cfs at the upstream of the segment (RM 35) increases to 12.6 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 11.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 11.3t) with which to document the historical record of standards contraventions in Segment 11.

Point and Nonpoint Source Discharges

The point source discharge in Segment 11 is listed and characterized in Exhibit B- 11.4t. The total waste flows from the point source is .005mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 11.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 11 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 11.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0.9 lb/day of TOD) is compared with the maximum theoretical load of 12,387 lb/day of TOD. The segment priority assigned to Segment 11 is 109.5.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 11 are presented in Exhibit B- 11.6t.

Segment Strategems

As shown in the profiles of Exhibit B-11.1g, this reach of the South Fork Licking River has a fairly high carrying capacity (e.g. MTDL - 12,387 lbs/day of TOD). Existing point sources loadings are so insignificant that water quality is indicated to be well above standards. The high percentage of agricultural land uses, and the relatively large estimated annual suspended sediment transport rate through the Segment indicate that nonpoint source pollution during periods of high stream flow may be the critical water quality management condition for Segment 11.

Exhibit B-11.2t

LICKING RIVER BASIN

SEGMENT 11 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	6245	6406	6626	7488
RURAL	4033	4013	4014	4543
FARM	2501	2488	2488	2805
NON-FARM	1532	1525	1526	1737
URBAN	2211	2392	2611	2945
HOUSING UNITS				
TOTAL	2219	2326	2467	2993
RURAL	1375	1395	1427	1732
URBAN	843	931	1040	1260
EMPLOYMENT				
TOTAL	1083	1231	1389	1655
MANUFACTURING	230	267	310	365
NON-MANUFACTURING	853	963	1079	1289
LAND USE				
TOTAL	187	187	187	187
RURAL	186	185	185	185
AGRICULTURE	143	143	143	143
SILVICULTURE	42	42	42	42
MINING	0	0	0	0
URBAN	0	1	1	1

Exhibit B-11.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05016	Pendleton Consolidated High School	UT - S. Fk. Licking River 511.2/51.7/1.4/1.3	N.I.	Extended Aeration	0	0.0048	40	40	10

Exhibit B-11.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05016	Pendleton Consolidated High School	0.45 BOD	0.0054	10/95%	10/96%	1/96%	8	--------
	Segment 11	0.45 BOD						109.5

Exhibit B-11.6t - Municipal Needs - Licking River Basin

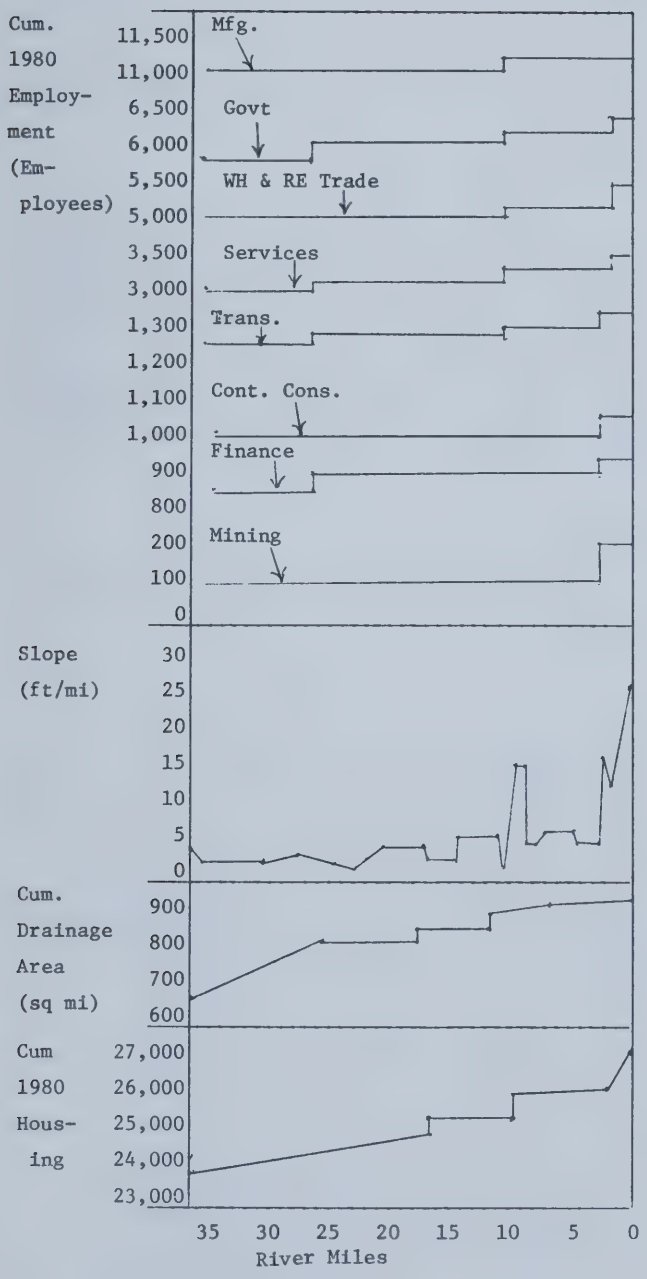
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

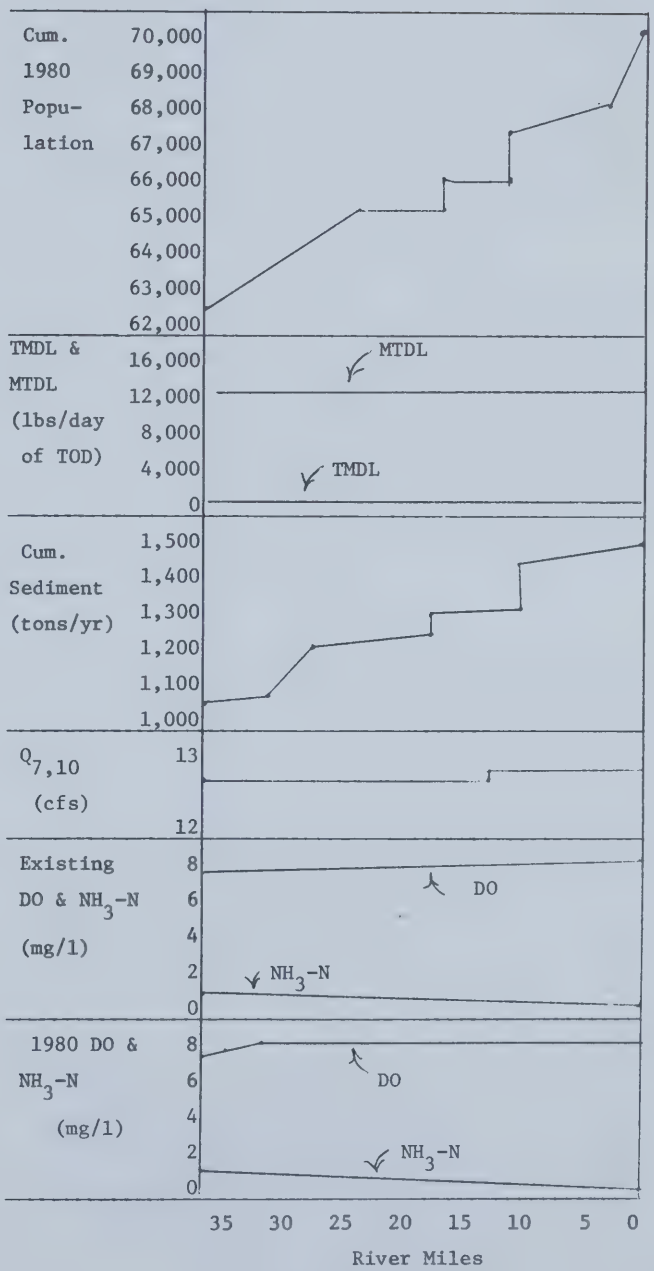
Exhibit B-11.1g Licking River Basin

Segment No. 11 Upstream Segments: 14

Downstream Segment: 2

Mainstem: South Fork Licking River





SEGMENT NO. 12 ANALYSIS

Classification: WQL Priority:106.0

Description

The location of Segment No. 12 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-12 .1g. The former map shows the relative position of Segment No. 12 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 12 is listed in Exhibit B-12.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 12 (population, housing units, employment, and land use) are presented in Exhibit B- 12.2t and profiles of 1980 data are presented in Exhibit B- 12.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 52 square miles of which 1.9 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-12.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 16.5) increases to .12 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 12.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 12.3t) with which to document the historical record of standards contraventions in Segment 12.

Point and Nonpoint Source Discharges

The point source discharge in Segment 12 is listed and characterized in Exhibit B- 12.4t. The total waste flows from the point source is .007 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 12.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 12 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 12.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (1.27 lb/day of TOD) is compared with the maximum theoretical load of 2 lb/day of TOD. The segment priority assigned to Segment 12 is 106.0.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 12 are presented in Exhibit B- 12.6t.

Segment Strategems

The major impact in Segment No. 12 is caused by the City of Williamstown which is located at the headwaters of Cooperstown Creek. The impact of two small package plant discharges which flow into the mainstem of the Segment at RM 12.8 is delineated in Exhibit 12.1g. The capacity of Fork Lick Creek to assimilate additional point discharges is indicated to be minimal; thus, the 201 Facilities Plan for the Williamstown Area should give true consideration to this condition.

Exhibit B-12.2t

LICKING RIVER BASIN

SEGMENT 12 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1486	1529	1582	1758
RURAL	1167	1179	1196	1270
FARM	786	795	806	854
NON-FARM	380	384	390	416
URBAN	319	349	386	488
HOUSING UNITS				
TOTAL	669	703	745	878
RURAL	544	563	586	664
URBAN	124	139	159	214
EMPLOYMENT				
TOTAL	126	145	164	186
MANUFACTURING	12	16	21	24
NON-MANUFACTURING	114	128	143	161
LAND USE				
TOTAL	51	51	51	51
RURAL	51	50	50	50
AGRICULTURE	32	32	32	32
SILVICULTURE	18	18	18	18
MINING	0	0	0	0
URBAN	0	1	1	1

Exhibit B-12.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05076	Lost Valley Recreation Park	Fork Lick Cr./S. Fk. Licking/Licking River 511.2/51.7/11.4/14.6	N.I.	Extended Aeration	0	0.0020	40	40	10
05075	AT & T Long Lines Dept. Williamstown	Williamstown Cr./Coopertown Cr./Fork Lick Cr./S. Fk. Licking River 511.2/51.7/11.4/8.2/4.8/2.1	N.I.	Extended Aeration	0	0.0032	40	40	10
05074	AT & T Williamstown	Williamstown Cr./Coopertown Cr./Fork Lick Cr./S. Fk. Lick Cr./Licking River 511.2/51.7/11.4/8.2/4.8/2.0	0021831	Extended Aeration	.006	0.0016	40	40	10

Exhibit B-12.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05076	Lost Valley Recreation Park	0.18 BOD	0.0022	10/95%	10/96%	1/96%	8	--------
05075	AT & T Long Lines Dept. Williamstown	0.30 BOD	0.0036	10/95%	10/96%	1/96%	8	--------
05074	AT & T Williamstown	0.15 BOD	0.0018	10/95%	10/96%	1/96%	4	--------
	Segment 12	0.63 BOD						106

Exhibit B-12.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

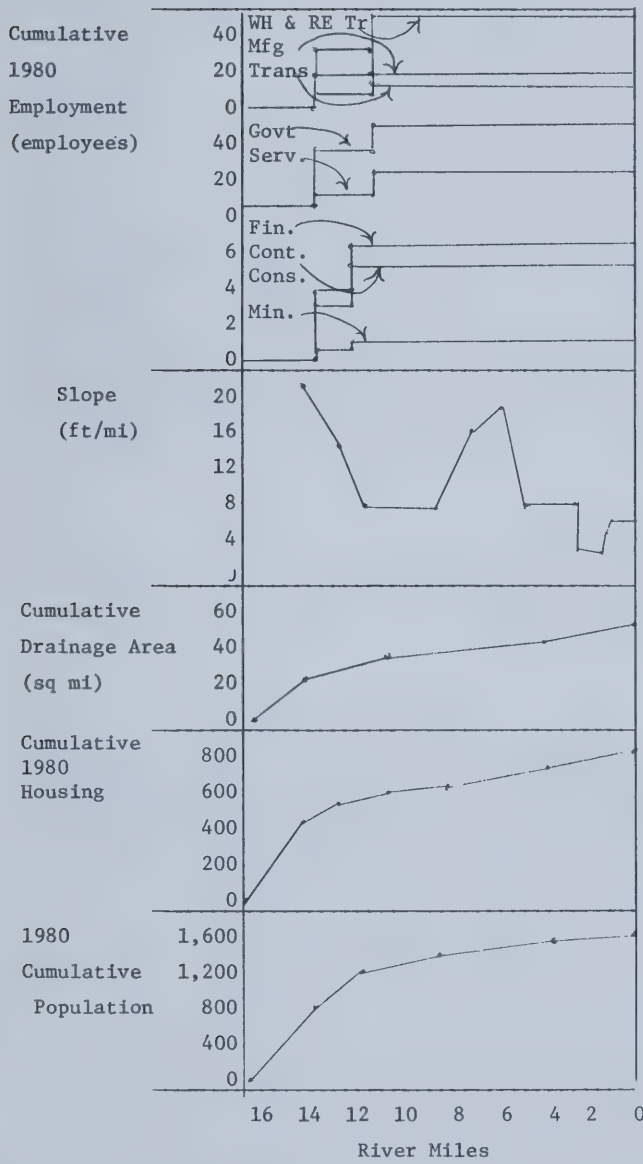
Exhibit B-12.1g Licking River Basin

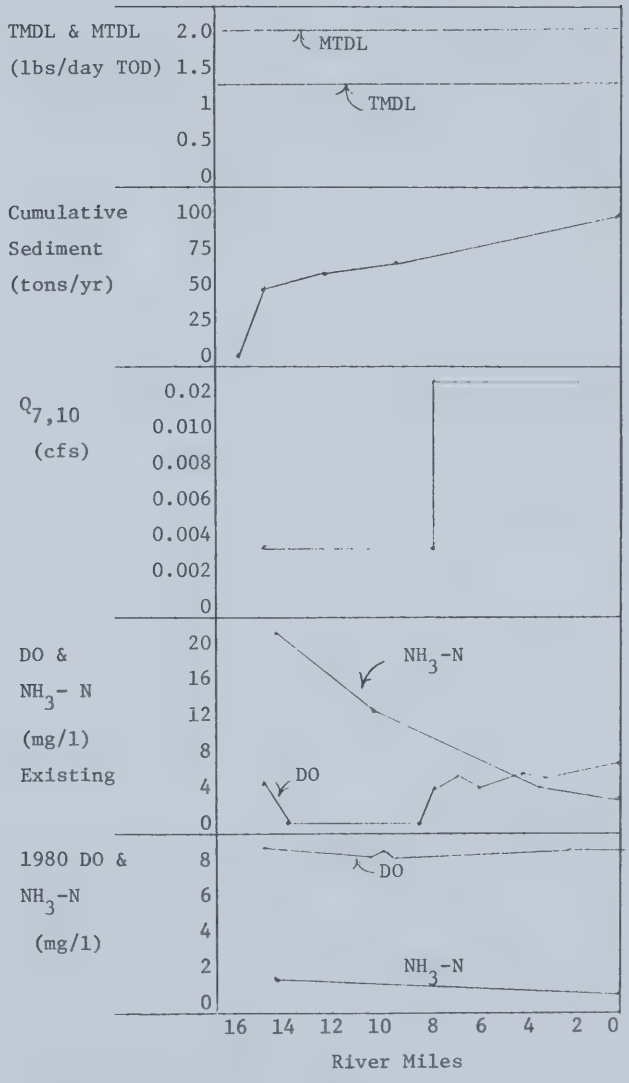
Segment No. 12

Upstream Segments: --

Downstream Segment: 11

Mainstem: Fork Lick Creek





SEGMENT NO. 13 ANALYSIS

Classification: EL Priority: 100.6

Description

The location of Segment No. 13 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-13 .1g. The former map shows the relative position of Segment No. 13 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 13 is listed in Exhibit B-13.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 13 (population, housing units, employment, and land use) are presented in Exhibit B- 13.2t and profiles of 1980 data are presented in Exhibit B- 13.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 23 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-13.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 13.9) increases to 0 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 13.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 13.3t) with which to document the historical record of standards contraventions in Segment 13 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 13 is listed and characterized in Exhibit B- 13.4t. The total waste flows from the point source is 0 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 13.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 13 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 13.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 13 is 100.6.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 13 are presented in Exhibit B- 13.6t.

Segment Strategems

Agriculture is the most important economic activity in Segment No. 13. There are no existing point discharges and the estimates of total sediment transport within the Crooked Creek Basin are rather low. The present water quality in this Segment is predicted to meet the critical stream standards.

Exhibit B-13.2t

LICKING RIVER BASIN

SEGMENT 13 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	603	614	628	747
RURAL	537	540	545	638
FARM	360	362	366	430
NON-FARM	176	177	179	208
URBAN	66	73	83	108
HOUSING UNITS				
TOTAL	255	266	279	353
RURAL	226	233	241	301
URBAN	28	32	37	52
EMPLOYMENT				
TOTAL	33	38	45	72
MANUFACTURING	3	4	5	9
NON-MANUFACTURING	30	33	37	63
LAND USE				
TOTAL	23	23	23	23
RURAL	23	23	23	23
AGRICULTURAL	16	16	16	16
SILVICULTURE	6	6	6	6
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-13.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
NO DISCHARGES IN THIS SEGMENT.									

Exhibit B-13.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
NO DISCHARGERS IN THIS SEGMENT.								

Exhibit B-13.6t - Municipal Needs - Licking River Basin

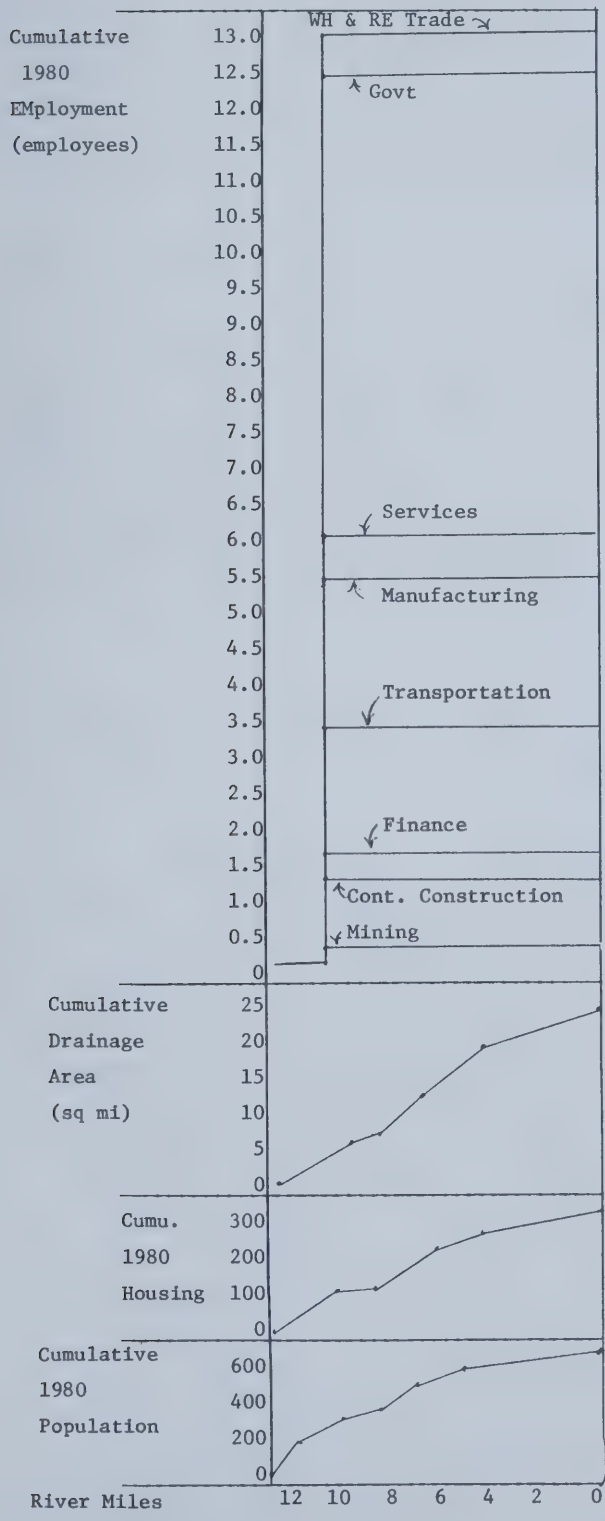
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

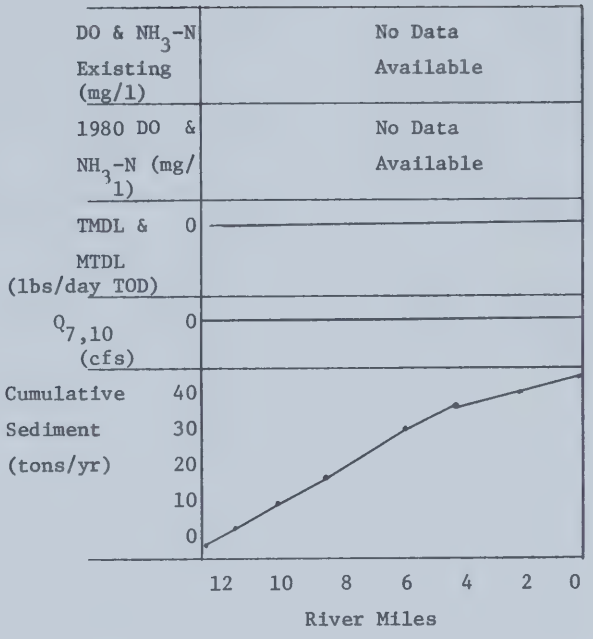
Exhibit B-13.1g Licking River Basin

Segment No. 13 Upstream Segment: --

Downstream Segment: 11

Mainstem: Crooked Creek





SEGMENT NO. 14 ANALYSIS

Classification: WQL Priority: 496.2

Description

The location of Segment No. 14 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-14 .1g. The former map shows the relative position of Segment No. 14 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 14 are listed in Exhibit B-14.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 14(population, housing units, employment, and land use) are presented in Exhibit B- 14.2t and profiles of 1980 data are presented in Exhibit B-14 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Cynthiana - Municipal - RM 48.6
- Best Tool & Die - Industrial - RM 45.7
- Weber Sausage Co. - Industrial - RM 42.9
- Landish Co. - Industrial - RM 49.4

This Segment encompasses 54 square miles of which 7.4 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-14.1g. The 7 day Q_{10} flow of 10.4 cfs at the upstream of the segment (RM 49.6) increases to 12.6cfs at the downstream (RM 35). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 14.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 14.3t) with which to document the historical record of standards contraventions in Segment 14.

Point and Nonpoint Source Discharges

The point source discharges in Segment 14 are listed and characterized in Exhibit B- 14.4t. The total waste flows from the point sources is 1.3 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 14.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 14 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 14.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (1292 lb/day of TOD) is compared with the maximum theoretical load of 3412 lb/day of TOD. The segment priority assigned to Segment 14 is 496.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 14 are presented in Exhibit B- 14.6t.

Segment Strategems

The impact of the City of Cynthiana and its contiguous industries on main stem water quality is apparent in the profiles in Exhibit B-14.1g. As indicated by the data in Exhibit B-14.4t and Exhibit B-14.5t, the most significant water quality management problem in this segment of the South Fork at present is the overloading of the Cynthiana STP. Because excess assimilative capacity is available on the main stem of the Segment, the 201 Facilities Planning effort pending in the Cynthiana should examine closely the problem of how to best use the available assimilation capacity.

Exhibit B-14.2t

LICKING RIVER BASIN

SEGMENT 14 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	6467	6944	7544	9726
RURAL	1485	1474	1469	2499
FARM	937	930	927	1577
NON-FARM	548	544	542	922
URBAN	4981	5469	6075	7226
HOUSING UNITS				
TOTAL	2351	2563	2834	3847
RURAL	475	481	490	689
URBAN	1875	2081	2343	2958
EMPLOYMENT				
TOTAL	2630	3308	3984	5064
MANUFACTURING	1089	1313	1533	1779
NON-MANUFACTURING	1541	1994	2450	3284
LAND USE				
TOTAL	53	53	53	53
RURAL	50	49	49	49
AGRICULTURE	45	44	44	44
SILVICULTURE	5	5	5	5
MINING	0	0	0	0
URBAN	3	4	4	4

Exhibit B-14.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05071	Northside Elementary School	UT - S. Fk. Licking/ Licking River 511.2/51.7/44.8/0.2	N.I.	Extended Aeration	0	0.0048	40	40	10
05072	Best Tool & Die	S. Fk. Licking/Licking River 511.2/51.7/45.65	N.I.	Extended Aeration	12.561	0.004	40	40	10
05073	Northside Trailer Park	UT - Sycamore Cr./S. Fk. Licking/Licking River 511.2/51.7/40.25/2.6/0.4	N.I.	Extended Aeration	0	0.0032	40	40	10
05079	Cynthiana STP	S. Fk. Licking/Licking River 511.2/51.7/48.6	0023370 0023370	Trickling Filter	12.560	1.0	50	50	20
05080	Belle Air Bowling Lanes	Indian Cr./S. Fk. Licking/ Licking River 511.2/51.7/45.7/5	N.I.	Extended Aeration	0	0.0008	40	40	10
05081	Royal Pig Dairy Queen	UT - Grays Run/S. Fk. Licking/Licking River 511.2/51.7/49.4/1.0/0.9	N.I.	Extended Aeration	.001	0.0012	40	40	10
05082	Kocolene Serv. Station	UT - Grays Run/S. Fk. Licking/Licking River 511.2/51.7/49.4/1.0/0.95	N.I.	Extended Aeration	0	0.0008	40	40	10
05083	Webber Sausage Co.	S. Fk. Licking/Licking River 511.2/51.7/42.85	0001627	Extended Aeration	12.608	0.017	30	30	6
05087	Howard Discount Shopping Center	UT - Grays Run/S. Fk. Licking/Licking River 511.2/51.7/49.4/1.0/0.2	N.I.	Extended Aeration	.003	0.0065	40	40	10
05183	Ladish Co. Eaton Corp.	Pond/S. Fk. Licking/ Licking River 511.2/51.7/49.4	0001741	---	12.560	0.26	---	---	---

Exhibit B-14.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05071	Northside Elementary School	0.45 BOD	0.0054	10/95%	10/96%	1/96%	8	--------
05072	Best Tool & Die	1.13 BOD	0.0045	30/85%	30/88%	20/20%	4	--------
05073	Northside Trailer Park	0.30 BOD	0.0036	10/95%	10/96%	1/96%	8	--------
05079	Cynthiana STP	280.22 BOD	1.12	30/85%	30/88%	20/20%	4	614.1 Ca
05080	Belle Air Bowling Lanes	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05081	Royal Pig Dairy Queen	0.11 BOD	0.0013	10/95%	10/96%	1/96%	4	--------
05082	Kocolene Service Station	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05083	Webber Sausage Co.	5.00 BOD	0.020	30/85%	30/88%	20/20%	4	--------
05087	Howard Discount Shopping Center	0.58 BOD	0.0070	10/95%	10/96%	1/96%	4	--------
05183	Ladish Co. Eaton Corp.	N.A.	------	------	------	------	---	--------
	Segment 14	287.95 BOD						496.2

Exhibit B-14.6t - Municipal Needs - Licking River Basin

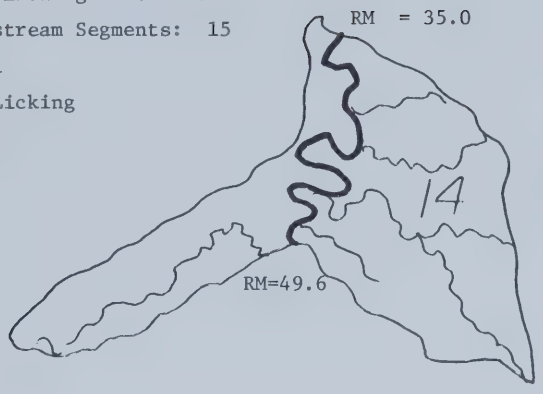
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05079	Cynthiana			1977
	Treatment	T1A	1,395,000	
	Interceptors	N.A.	1,278,000	
	Collectors	N.A.	1,667,000	
	Infiltration & Inflow	N.A.	580,000	
	Combined Sewer	N.A.	282,000	

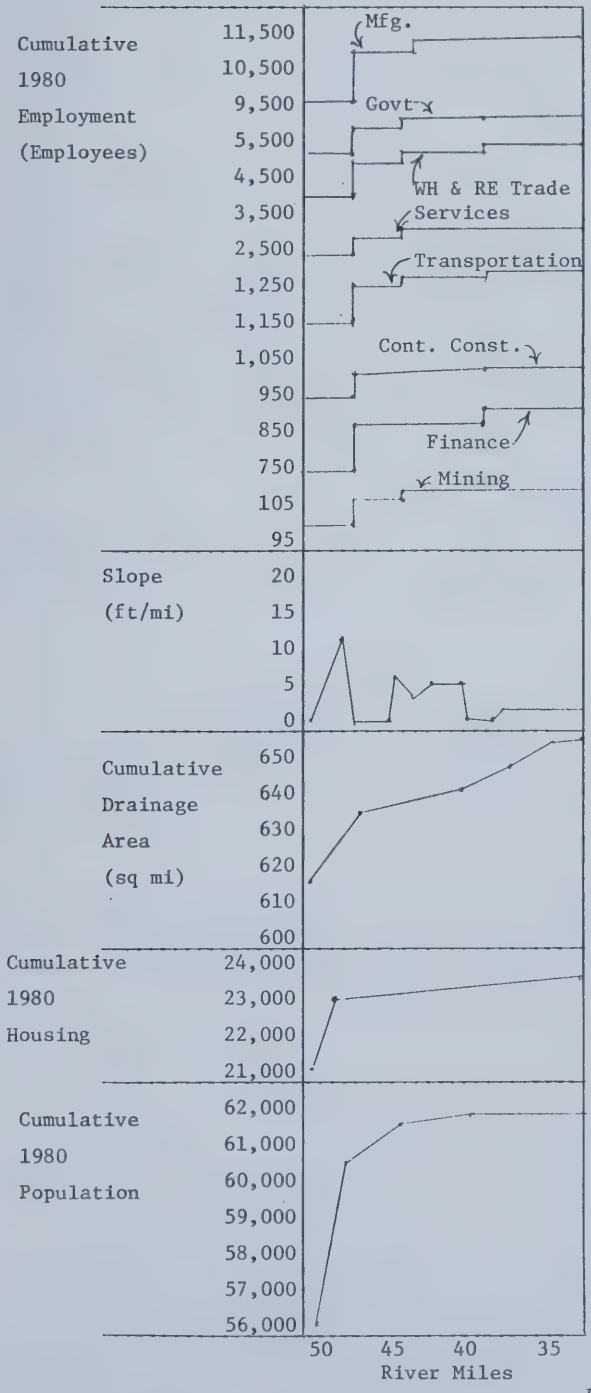
Exhibit B-14.1g Licking River Basin

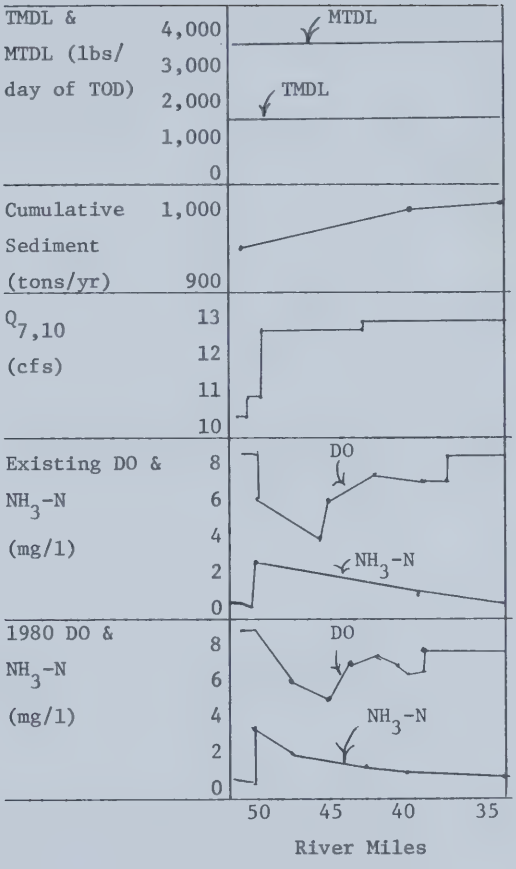
Segment No. 14 Upstream Segments: 15

Downstream Segment: 11

Mainstem: South Fork Licking







SEGMENT NO. 15 ANALYSIS

Classification: EL Priority: 104.0

Description

The location of Segment No. 15 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-15 .1g. The former map shows the relative position of Segment No. 15 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 15 is listed in Exhibit B-15.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 15 (population, housing units, employment, and land use) are presented in Exhibit B-15 .2t and profiles of 1980 data are presented in Exhibit B- 15.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 65 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-15.1g. The 7 day Q_{10} flow of 10.4 cfs at the upstream of the segment (RM 65) increases to 10.4 cfs at the downstream (RM 49.0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 15.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 15.3t) with which to document the historical record of standards contraventions in Segment 15.

Point and Nonpoint Source Discharges

The point source discharge in Segment 15 is listed and characterized in Exhibit B- 15.4t. The total waste flows from the point source is .0005 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 15.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 15 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 15.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.08 lb/day of TOD) is compared with the maximum theoretical load of 34431b/day of TOD. The segment priority assigned to Segment 15 is 104.0.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 15 are presented in Exhibit B- 15.6t.

Segment Strategems

Segment No. 15 covers the reach of South Fork Licking River between the confluence of Hinkston and Stoner Creeks and the City of Cynthiana. Essentially none of the TMDL is currently being used and existing and projected water quality are indicated to be very good.

Seagrams has a distillery which discharged approximately 100,000 gpd at River Mile 56 until 1973 when the plant closed. Should this operation be reactivated the water quality situation in Segment No. 15 would require re-examination.

Exhibit B-15.2t

LICKING RIVER BASIN

SEGMENT 15 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	3467	3518	3605	4136
RURAL	2006	2005	2026	2436
FARM	1148	1146	1156	1401
NON-FARM	857	858	870	1035
URBAN	1460	1513	1578	1702
HOUSING UNITS				
TOTAL	1222	1268	1331	1641
RURAL	671	685	710	920
URBAN	551	582	621	720
EMPLOYMENT				
TOTAL	770	915	1036	1227
MANUFACTURING	319	363	399	431
NON-MANUFACTURING	451	552	637	795
LAND USE				
TOTAL	65	65	65	65
RURAL	64	64	64	64
AGRICULTURE	58	58	58	58
SILVICULTURE	6	6	6	6
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-15.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05086	Southern Bell T & T	UT - Townsend Cr./S. Fk. Licking/Licking River 511.2/51.7/59.8/13.8/0.7	N.I.	Septic Tank Sand Filter	0	0.0005	50	25	25
05190	Seagrams	S. Fk. Licking/Licking River 511.2/51.7/56.25	0002371	Aerated Lagoon	-----	0	---	---	---

Exhibit B-15.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05086	Southern Bell T & T	0.04 BOD	0.0005	10/95%	10/96%	1/96%	8	--------
05190	Seagrams	N.A.	------	------	------	------	------	--------
	Segment 15	0.04 BOD						104

Exhibit B-15.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

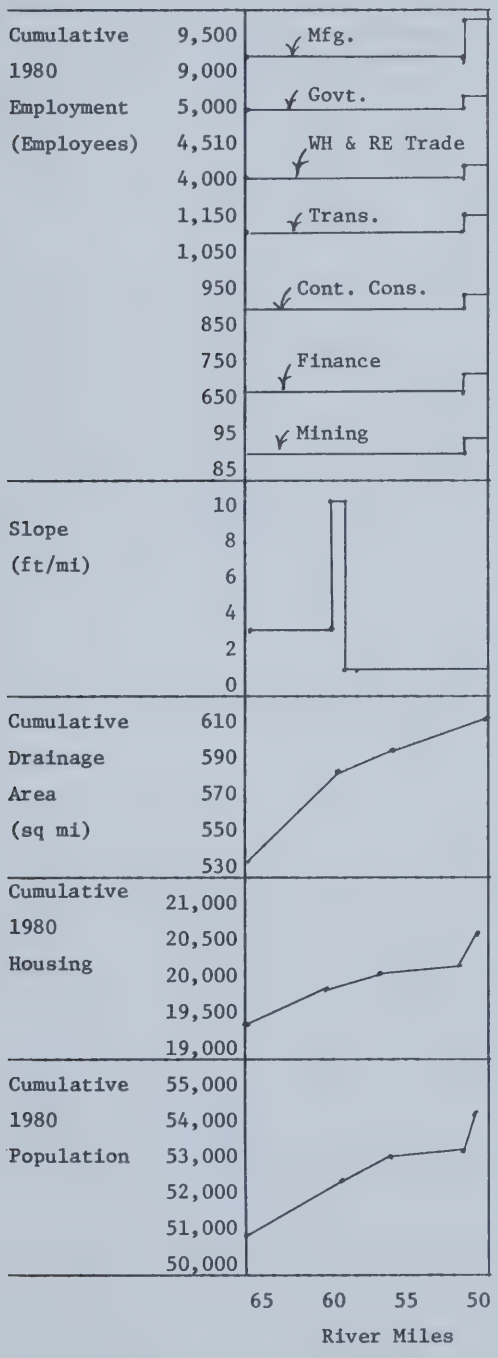
Exhibit B-15.1g Licking River Basin

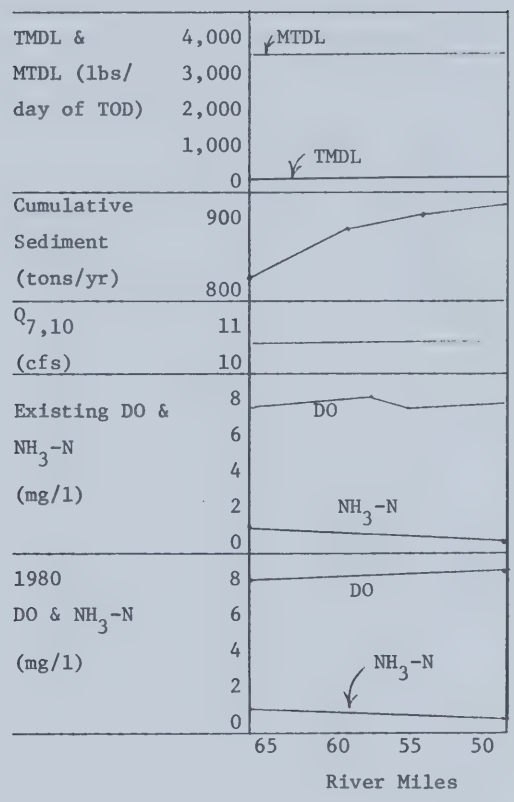
Segment No. 15

Upstream Segments: 17

Downstream Segment: 14

Mainstem: South Fork Licking





SEGMENT NO. 16 ANALYSIS

Classification: WQL Priority: 1738

Description

The location of Segment No. 16 is shown in the Segment Map of Exhibit B-0.1m , and Exhibit B-16 .1g. The former map shows the relative position of Segment No. 16 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 16 are listed in Exhibit B-16.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 16 (population, housing units, employment, and land use) are presented in Exhibit B- 16.2t and profiles of 1980 data are presented in Exhibit B- 16.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Carlisle - Municipal - RM 81.0
- Mt. Sterling - Municipal - RM 131.0
- Bluegrass Knitting - Industrial - RM 81.0
- Hobart Industries - Industrial - RM 133.5
- A. O. Smith - Industrial - RM 130.6

This Segment encompasses 256 square miles of which 2.3 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-16.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 136) increases to 4.5 cfs at the downstream (RM 65). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 16.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 16.3t) with which to document the historical record of standards contraventions in Segment 16.

Point and Nonpoint Source Discharges

The point source discharges in Segment 16 are listed and characterized in Exhibit B- 16.4t. The total waste flows from the point sources is 2.8 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 16.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 16 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 16.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (449 lb/day of TOD) is compared with the maximum theoretical load of 5950 lb/day of TOD. The segment priority assigned to Segment 16 is 1738.0.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 16 are presented in Exhibit B- 16.6t.

Segment Strategems

The very high projected costs for treatment facilities are consistent with the 1980 waste load projections, the hydrology of Hinkston Creek and the projections of growth and development in the Segment, especially at the headwaters in the Mt. Sterling Area. These factors combine to focus on the needs for continued investigations and refinement of the water quality and modeling data base, the evaluation of alternative water quality and wastewater management strategies, and the assessment of the social, political and economic impacts of these alternatives. The 201 Facilities Planning programs for Carlisle, Millersburg and Mt. Sterling should provide the arenas for addressing some , but not all, of these issues.

Exhibit B-16.2t

LICKING RIVER BASIN

SEGMENT 16 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	15875	17071	18556	22216
RURAL	8050	8200	8421	11439
FARM	4085	4148	4245	5534
NON-FARM	3965	4052	4176	5904
URBAN	7824	8871	10135	10777
HOUSING UNITS				
TOTAL	6356	6931	7668	9705
RURAL	3226	3339	3491	4921
URBAN	3130	3592	4177	4784
EMPLOYMENT				
TOTAL	6243	7814	9685	10892
MANUFACTURING	3136	3843	4666	4893
NON-MANUFACTURING	3107	3971	5018	5999
LAND USE				
TOTAL	255	255	255	255
RURAL	252	250	250	250
AGRICULTURAL	235	232	232	232
SILVICULTURAL	17	17	17	17
MINING	0	0	0	0
URBAN	3	5	5	5

Exhibit B-16.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05088	Carlisle STP	Brushy Fk./Bid Brushy Cr./ Hinkston Cr./Licking River 511.2/51.7/81.0/4.7/2.43	0020923	Trickling Filter	.169	0.12	40	40	20
05089	No. Central 4H Camp	UT - UT - Brushy Fk./Big Brushy Cr./Hinkston Cr./ Licking River 511.2/51.7/81.0/4.7/26.0 2.1/0.8	N.I.	Extended Aeration	0	0.01	40	40	10
05090	Nicholas Co. Hospital	Brush Fk./Big Brushy Cr./ Hinkston Cr./Licking River 511.2/51.7/81.0/4.7/6.1	N.I.	Extended Aeration	0	0.004	40	40	10
05091	Lawn View Mobile Home Park	UT - Brushy Cr./Hinkston Cr./Licking River 511.2/51.7/81.0/6.2/0.6	N.I.	Extended Aeration	0	0.0016	40	40	10
05093	Bluegrass Knitting	UT - Brushy Fk./Brushy Cr./ Hinkston Cr./Licking River 511.2/51.7/81.0/4.7/2.6/0.2	0002445	Aerated Lagoon & Clarifier	.014	0.1	27	30	24
05094	Mt. Sterling STP	Hinkston Cr./Licking River 511.2/51.7/131.0	0020044	Trickling Filter	.619	1.5	40	40	20
05095	Hobart Industries	Hinkston Cr./Licking River 511.2/51.7/133.5	0001201	Cooling Water Discharge	0	0.4	1.8	---	0.05
05096	I-64 West Bound Rest Area	UT - UT - Somerset Cr./ Grassy Lick Cr./Hinkston Cr./Licking River 511.2/51.7 114.2/4.5/5.6/0.1/0.7	0025488	Extended Aeration	0	0.0024	40	40	10
05097	Carnico Country Club	UT - Brushy Cr./Hinkston Cr./Licking River 511.2/51.7/81.0/8.95/1.5	N.I.	Extended Aeration	0	0	40	40	10
05098	Millersburg	Hinkston Cr./Licking River 511.2/51.7/77.5	N.I.	----------	4.546	0.1	200	250	25
05184	A. O. Smith	Hinkston Cr./Licking River 511.2/51.7/130.6	0002771	N.A.	3.094	0.6	---	---	---

Exhibit B-16.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05088	Carlisle STP	13.34 BOD	0.16	10/95%	10/96%	1/96%	4	253.9 Ca
05089	North Central 4H Camp	0.83 BOD	0.01	10/95%	10/96%	1/96%	8	--------
05090	Nicholas County Hospital	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05091	Lawn View Mobile Home Park	0.15 BOD	0.0018	10/95%	10/96%	1/96%	8	--------
05093	Bluegrass Knitting	8.34 BOD	0.010	10/95%	10/96%	1/96%	8	--------
05094	Mt. Sterling STP	133.44 BOD	1.6	10/95%	10/96%	1/96%	8	3444.4 Ca
05095	Hobart Industries	N.A.	------	------	------	------	------	--------
05096	I-64 West Bound Rest Area	0.23 BOD	0.0027	10/95%	10/96%	1/96%	8	--------
05097	Carnico Country Club	0.50 BOD	0.006	10/95%	10/96%	1/96%	8	--------
05098	Millersburg	30.02 BOD	0.12	30/85%	30/88%	20/20%	4	702.8 Ca
05184	A. O. Smith	N.A.	------	------	------	------	------	------
	Segment 16	187.23 BOD						173.8

Exhibit B-16.6t - Municipal Needs - Licking River Basin

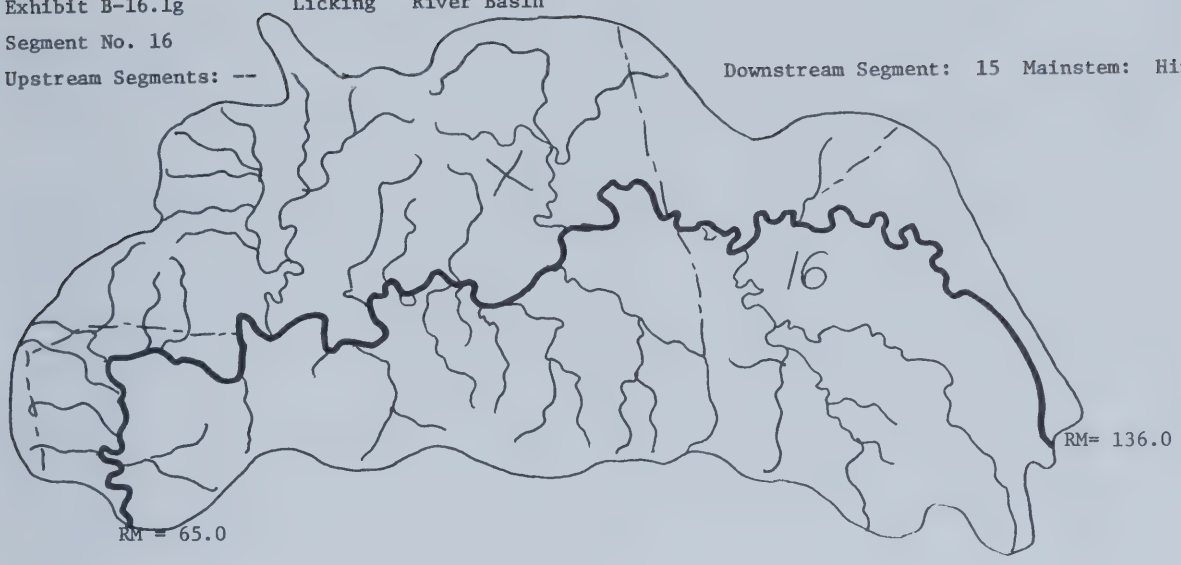
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05094	Mt. Sterling			1977
	Treatment	T4B	1,759,000	
	Interceptors	N.A.	477,000	
	Collectors	N.A.	750,000	
	Infiltration & Inflow	N.A.	253,000	
05088	Carlisle			1977
	Treatment	T4A	324,000	
	Interceptors	N.A.	63,000	
	Collectors	N.A.	594,000	
	Infiltration & Inflow	N.A.	142,000	
05098	Millersburg			1977
	Treatment	T1A	521,000	
	Interceptors	N.A.	1,228,000	
	Collectors	N.A.	568,000	
	Infiltration & Inflow	N.A.	96,000	

Exhibit B-16.1g Licking River Basin

Segment No. 16

Upstream Segments: --

Downstream Segment: 15 Mainstem: Hinkston Creek



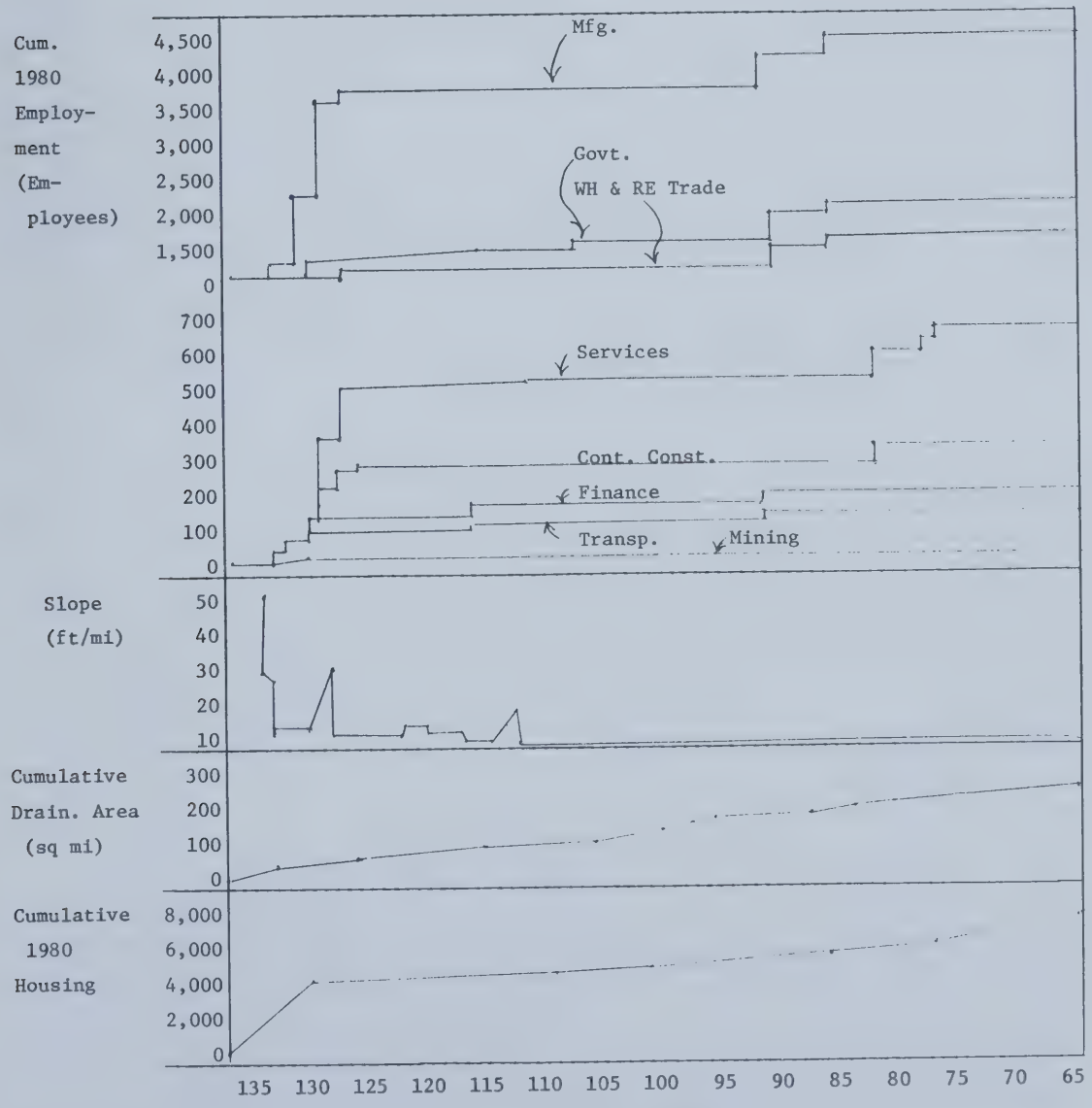


Exhibit B-16.1g

Segment No. 16

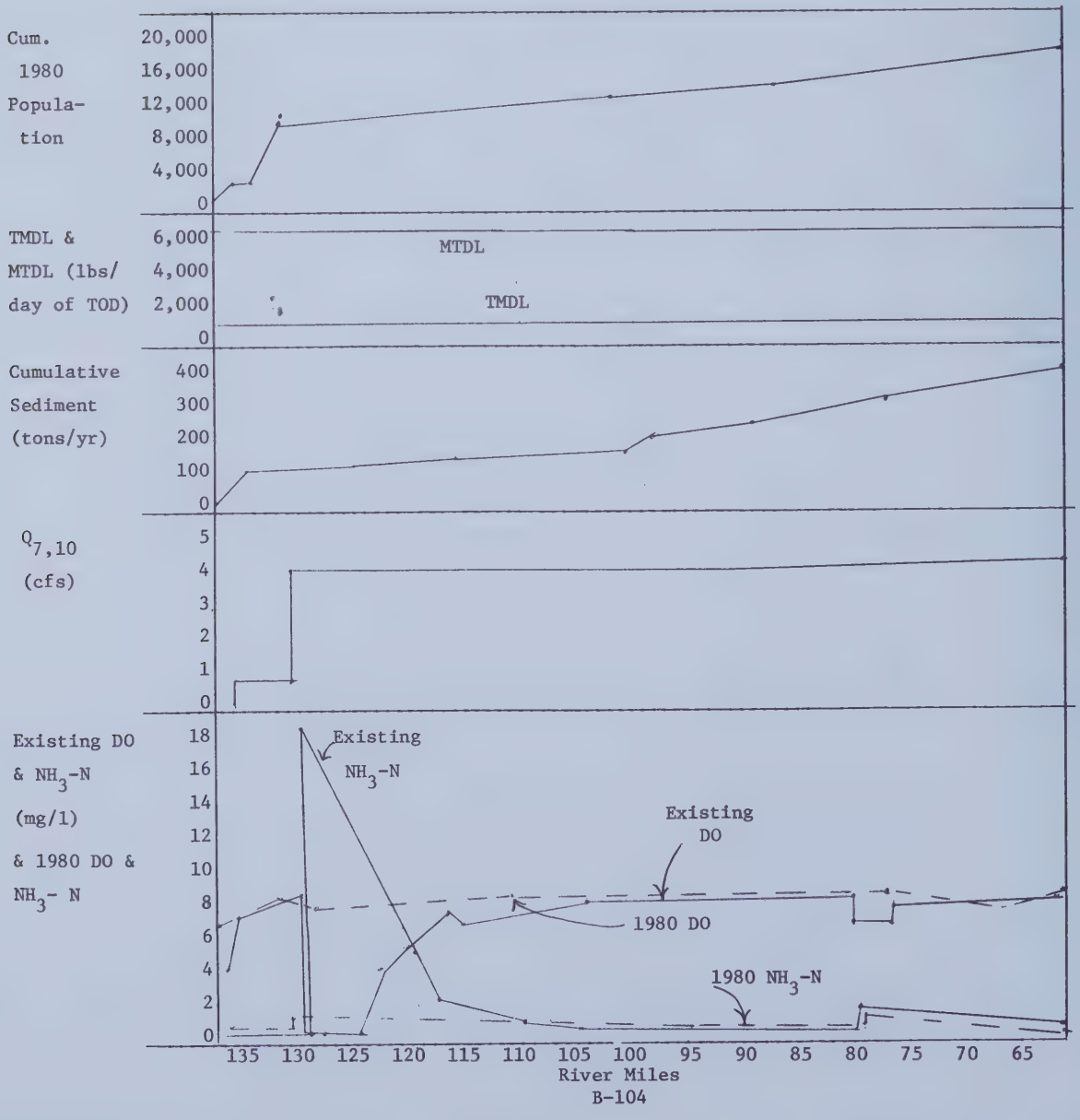
Upstream Segments: --

Downstream Segment: 15

Mainstem:

Hinkston Creek

Licking River Basin



B-104

SEGMENT NO. 17 ANALYSIS

Classification: WQL Priority: 316.3

Description

The location of Segment No. 17 is shown in the Segment Map of Exhibit B-0.1m , and Exhibit B-17 .1g. The former map shows the relative position of Segment No. 17 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 17 are listed in Exhibit B-17.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 17 (population, housing units, employment, and land use) are presented in Exhibit B- 17.2t and profiles of 1980 data are presented in Exhibit B- 17.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Paris - Municipal - RM 15.0
- Bourbon Packing Co. - Industrial - RM 14.0

This Segment encompasses 104 square miles of which 6.7 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-17.1g. The 7 day Q_{10} flow of 4.7 cfs at the upstream of the segment (RM 17.1) increases to 5.9 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 17.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 17.3t) with which to document the historical record of standards contraventions in Segment 17 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 17 are listed and characterized in Exhibit B- 17 .4t. The total waste flows from the point sources is .6 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 17 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 17 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 17.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (814 lb/day of TOD) is compared with the maximum theoretical load of 2.254 lb/day of TOD. The segment priority assigned to Segment 17 is 316.3.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 17 are presented in Exhibit B- 17.6t.

Segment Strategems

As shown on the profiles in Exhibit B-17.1g, the City of Paris and its contiguous industries exert the major impacts in the reach of Stoner Creek in this Segment. An issue to be examined in the 201 Facilities Planning program for Paris will be how to best utilize the excess assimilative capacity available in the stream reach below the existing Paris STP.

Exhibit B-17.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 17 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	12451	12777	13235	15029
RURAL	4510	4536	4624	5406
FARM	2210	2222	2265	2650
NON-FARM	2300	2313	2359	2756
URBAN	7941	8241	8612	9621
HOUSING UNITS				
TOTAL	4316	4538	4832	5915
RURAL	1402	1507	1580	1999
URBAN	2854	3031	3251	3915
EMPLOYMENT				
TOTAL	3268	4221	5091	6240
MANUFACTURING	882	1199	1484	1743
NON-MANUFACTURING	2385	3022	3607	4496
LAND USE				
TOTAL	103	103	103	103
RURAL	96	97	97	97
AGRICULTURE	95	93	93	93
SILVICULTURE	3	3	3	3
MINING	0	0	0	0
URBAN	4	6	6	6

Exhibit B-17.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05100	Bourbon Packing	Stoner Cr./S.Fk. Licking/ Licking River 511.2/51.7/65.1/14.04	0001635	Primary Settling & Extended Aeration	5.833	0.016	466	10.5	8.6
05101	Jerry's Drive-In	Houston Cr./Stoner Cr./ S. Fk. Licking/Licking River 511.2/51.7/65.1/15.55/7.62	N.I.	Extended Aeration	.019	0.0048	40	40	10
05102	Country Living Mobile Home Park	UT - UT - Houston Cr./Stoner Cr./S. Fk. Licking/Licking River 511.2/51.7/65.1/15.55/16.5/ 0.4/0.7	0024848	Extended Aeration	0	0.0060	40	40	10
05103	Peacock Trailer Park	Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/14.05	N.I.	Septic Tank & Sand Filter	5.831	0.0012	40	40	10
05104	Brown Apts.	Houston Cr./Stoner Cr./ S. Fk. Licking/Licking River 511.2/51.7/65.1/15.55/7.61	N.I.	Extended Aeration	.011	0.0016	40	40	10
05105	US-68 Road-side Park	UT - Flat Run Cr./Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/3.8/5.75/ 0.7	N.I.	----------	0	-------	---	---	---
05099	Paris STP	Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/15	0021059	Trickling Filter	4.748	0.6	40	40	20

Exhibit B-17.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05100	Bourbon Packing	4.50 BOD	0.018	30/85%	30/88%	20/20%	4	--------
05101	Jerry's Drive-In	0.45 BOD	0.0054	10/95%	10/96%	1/96%	4	--------
05102	Country Living Mobile Home Park	0.57 BOD	0.0068	10/95%	10/96%	1/96%	8	--------
05103	Peacock Trailer Park	0.33 BOD	0.0013	30/85%	30/88%	20/20%	4	--------
05104	Brown Apartments	0.45 BOD	0.0018	30/85%	30/88%	20/20%	4	--------
05105	US-68 Roadside Park	N.A.	------	------	------	------	------	--------
05099	Paris STP	175.14 BOD	0.70	30/85%	30/88%	20/20%	4	251 Ca
	Segment 17	181.44 BOD						316.3

Exhibit B-17.6t - Municipal Needs - Licking River Basin

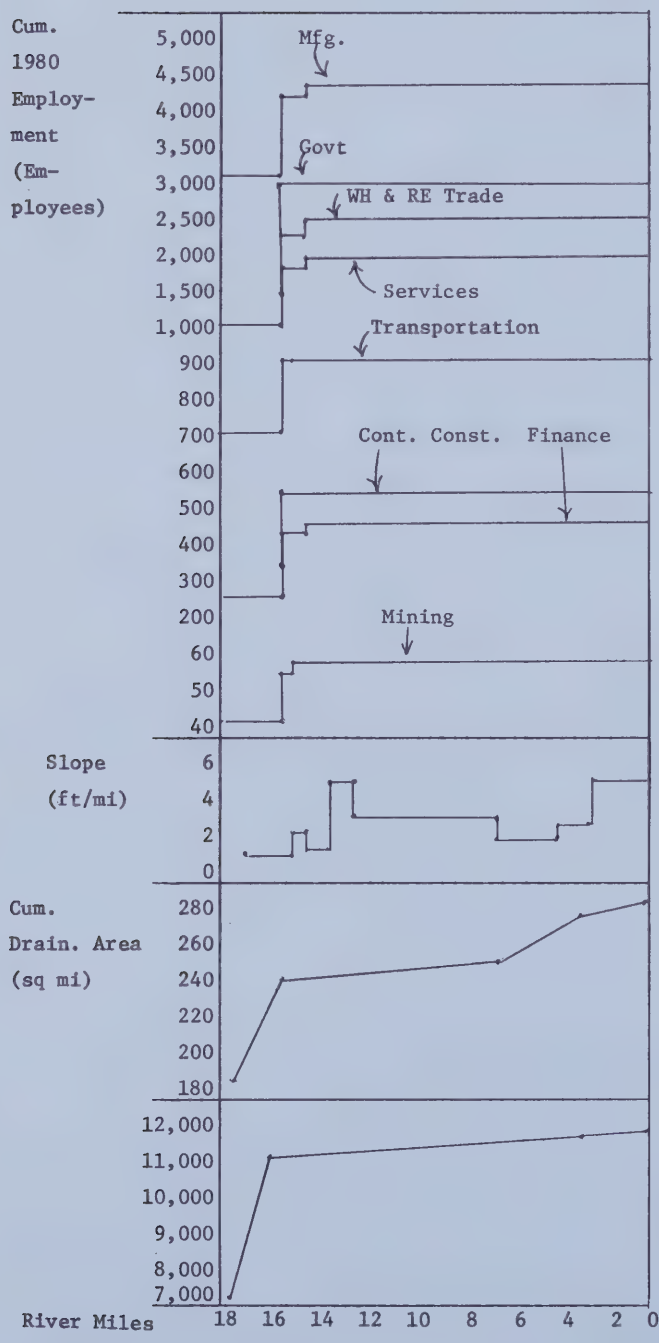
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
				1977
05099	Paris			
	Treatment	T1A	118,000	
	Interceptors	N.A.	279,000	
	Collectors	N.A.	2,270,000	
	Infiltration & Inflow	N.A.	113,000	

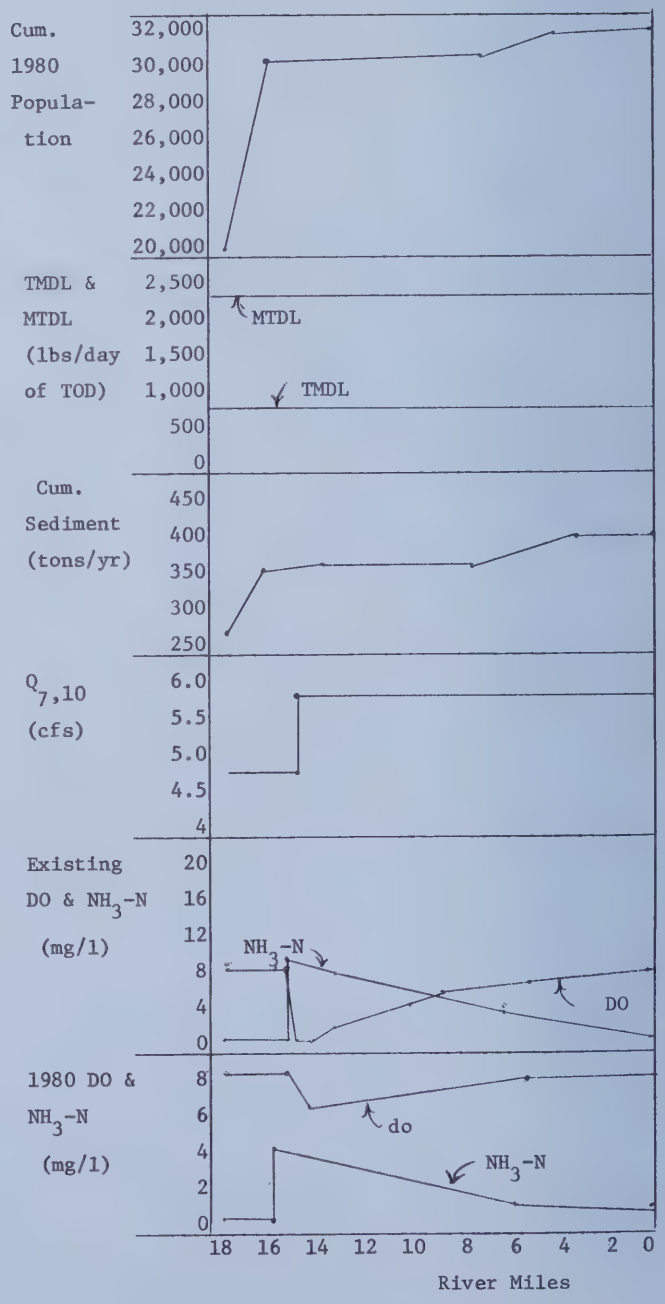
Exhibit B-17.1g Licking River Basin

Segment No. 17 Upstream Segments: 18

Downstream Segment: 15

Mainstem: Stoner Creek





SEGMENT NO. 18 ANALYSIS

Classification: EL **Priority:** 103.5

Description

The location of Segment No. 18 is shown in the Segment Map of Exhibit B-0.1m , and Exhibit B-18 .1g. The former map shows the relative position of Segment No. 18 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 18 is listed in Exhibit B-18.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 18 (population, housing units, employment, and land use) are presented in Exhibit B- 18.2t and profiles of 1980 data are presented in Exhibit B- 18.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 90 square miles of which 4.4 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-18.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 70) increases to 4.7 cfs at the downstream (RM 17.1). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 18.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 18.3t) with which to document the historical record of standards contraventions in Segment 18 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 18 is listed and characterized in Exhibit B- 18 .4t. The total waste flows from the point source is 0 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 18.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 18 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 18 .5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0 lb/day of TOD) is compared with the maximum theoretical load of 1206 lb/day of TOD. The segment priority assigned to Segment 18 is 103.5.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 18 are presented in Exhibit B- 18 .6t.

Segment Strategems

The major impacts on Segment No. 18 come from North Middleton (Segment No. 19) and Winchester (Segment 20) which enter Stoner Creek at RM 35.4 and RM 30 respectively. Future considerations of alternative water quality and wastewater management strategies for Segments No. 19 and 20 will of necessity overlap with those of Segment No. 18.

Exhibit B-18.2t

LICKING RIVER BASIN

SEGMENT 18 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	3037	3208	3460	4335
RURAL	2988	3061	3192	3739
FARM	1275	1305	1360	1600
NON-FARM	1713	1756	1831	2138
URBAN	49	147	267	595
HOUSING UNITS				
TOTAL	920	995	1102	1490
RURAL	905	950	1019	1288
URBAN	14	44	83	201
EMPLOYMENT				
TOTAL	26	82	165	437
MANUFACTURING	7	23	48	122
NON-MANUFACTURING	19	58	117	314
LAND USE				
TOTAL	90	90	90	90
RURAL	87	86	86	86
AGRICULTURE	83	82	82	82
SILVICULTURE	3	3	3	3
MINING	0	0	0	0
URBAN	3	4	4	4

Exibit B-18.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
NO DISCHARGES IN THIS SEGMENT.									

Exhibit B-18.5t - Waste Load Allocations (1980) - Licking River Basin

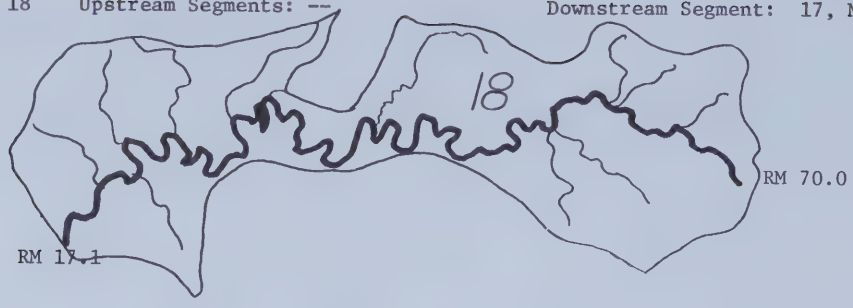
Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
NO DISCHARGERS IN THIS SEGMENT.								

Exhibit B-18.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

Exhibit B-18.1g Licking River Basin

Segment No. 18 Upstream Segments: -- Downstream Segment: 17, Mainstem: Stoner Creek



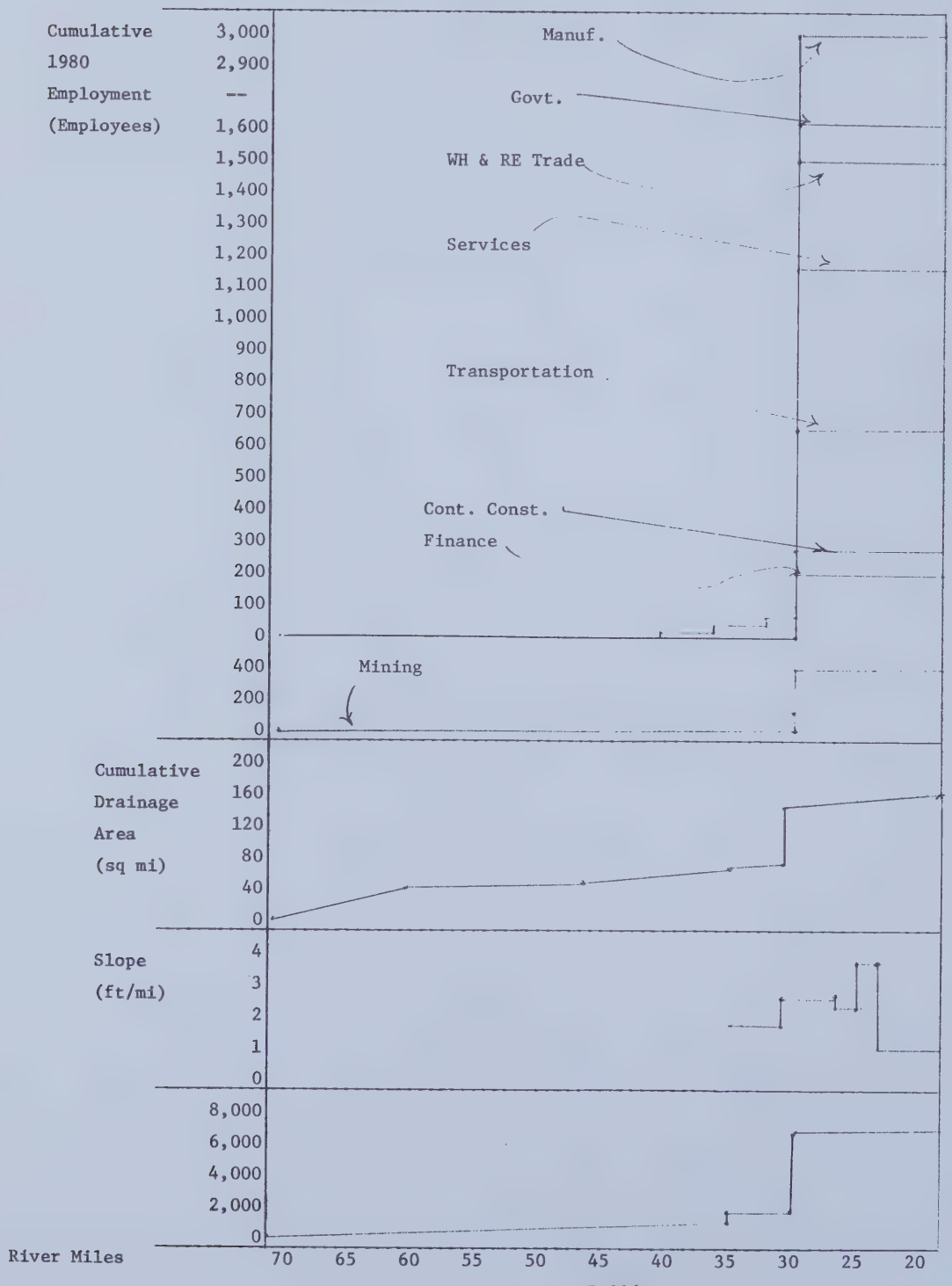
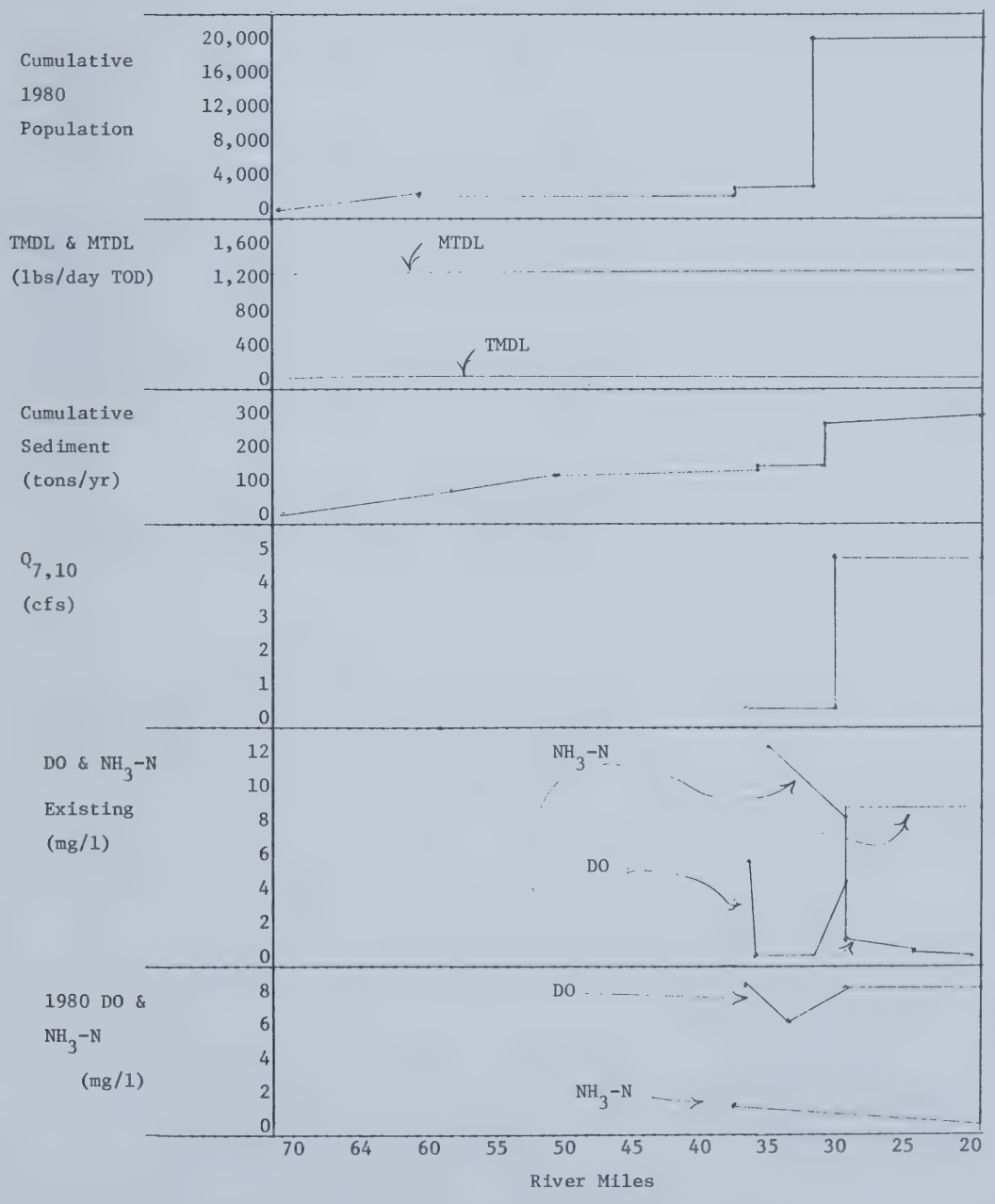


Exhibit B-18.1g Licking River Basin

Segment No. 18 Upstream Segments: -- Downstream Segment: 17 Mainstem: Stoner Creek



SEGMENT NO. 19 ANALYSIS

Classification: WQL Priority: 147.4

Description

The location of Segment No. 19 is shown in the Segment Map of Exhibit B-0.1m , and Exhibit B-19 .1g. The former map shows the relative position of Segment No. 19 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 19 is listed in Exhibit B-19.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 19 (population, housing units, employment, and land use) are presented in Exhibit B-19 .2t and profiles of 1980 data are presented in Exhibit B- 19.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- North Middleton - Municipal - RM 0.6

This Segment encompasses 5 square miles of which 20 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-19.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 3.8) increases to .08 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 19.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 19.3t) with which to document the historical record of standards contraventions in Segment 19.

Point and Nonpoint Source Discharges

The point source discharge in Segment 19 is listed and characterized in Exhibit B- 19.4t. The total waste flows from the point sources is .05 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 19.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 19 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B-19 .5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (9.01 lb/day of TOD) is compared with the maximum theoretical load of 4 lb/day of TOD. The segment priority assigned to Segment 19 is 147.4.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 19 are presented in Exhibit B- 19.6t.

Segment Strategems

The only discharge in Segment No. 19 is the North Middleton STP which enters Indian Creek at RM 0.6. The major impact of this discharge is exerted in Segment No. 18 (Stoner Creek), and no excess assimilative capacity exists in Segment No. 19.

Exhibit B-19.2t

LICKING RIVER BASIN

SEGMENT 19 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	544	585	639	817
RURAL	104	105	109	149
FARM	51	51	53	73
NON-FARM	53	53	55	76
URBAN	439	480	530	667
HOUSING UNITS				
TOTAL	204	225	252	346
RURAL	34	35	37	55
URBAN	170	189	215	291
EMPLOYMENT				
TOTAL	179	244	311	427
MANUFACTURING	48	69	90	119
NON-MANUFACTURING	131	174	220	308
LAND USE				
TOTAL	4	4	4	4
RURAL	4	3	3	3
AGRICULTURE	4	3	3	3
SILVICULTURE	0	0	0	0
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-19.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05106	North Middletown STP	Indian Cr./Stoner Cr./ S. Fk. Licking 511.2/51.7/65.1/35.4/0.6	N.I.	Lagoon	0	0.048	50	50	25

Exhibit B-19.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05106	North Middletown STP	4.50 BOD	0.054	10/95%	10/96%	1/96%	8	182 Ca
	Segment 19	4.50 BOD						147.4

Exhibit B-19.6t - Municipal Needs - Licking River Basin

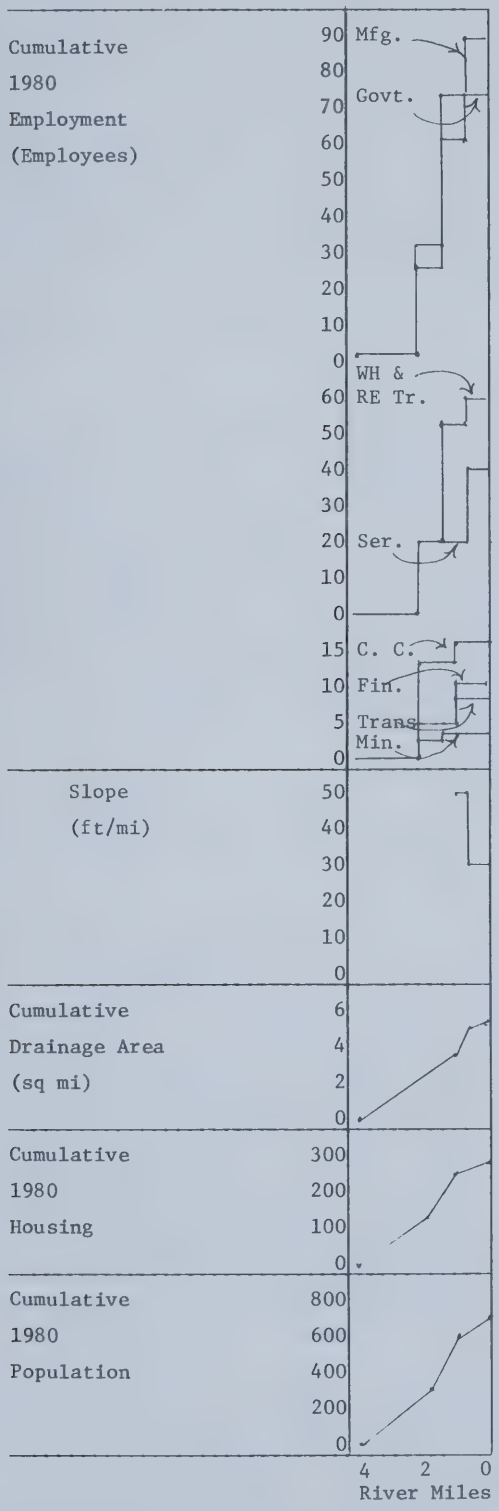
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05106	North Middletown			1977
	Treatment	T4B	638,000	
	Interceptor	N.A.	14,000	
	Collectors	N.A.	65,000	
	Infiltration & Inflow	N.A.	86,000	

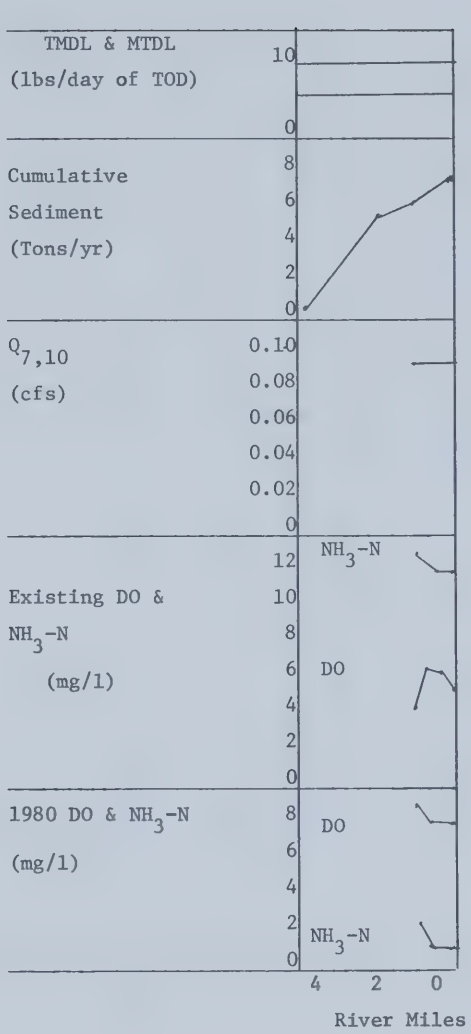
Exhibit B-19.1g Licking River Basin

Segment No. 19 Upstream Segments: --

Downstream Segment: 18

Mainstem: Indian Creek





SEGMENT NO. 20 ANALYSIS

Classification: WQL Priority: 2153.2

Description

The location of Segment No. 20 is shown in the Segment Map of Exhibit B-0.3m , and Exhibit B-20 .1g. The former map shows the relative position of Segment No. 20 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 20 are listed in Exhibit B-20.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 20 (population, housing units, employment, and land use) are presented in Exhibit B- 20.2t and profiles of 1980 data are presented in Exhibit B- 20.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Winchester Town Branch - Municipal - RM 22.1
- Winchester Strodes Creek - Municipal - RM 22.1
- Rockwell International - Industrial - RM 20.5
- GTE Sylvania - Industrial - RM 22.1
- Verna Hills. Subd. - Domestic - RM 20.5

This Segment encompasses 82 square miles of which 6.1 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-20.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 25.9) increases to 4.6 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 20.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 20.3t) with which to document the historical record of standards contraventions in Segment 20 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 20 are listed and characterized in Exhibit B- 20.4t. The total waste flows from the point sources is 2.6 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 20.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 20 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 20.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (498 1b/day of TOD) is compared with the maximum theoretical load of 2441 1b/day of TOD. The segment priority assigned to Segment 20 is 2153.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 20 are presented in Exhibit B- 20.6t.

Segment Strategems

The projected and potential costs for wastewater management from both point and nonpoint sources are quite high in Segment 20. The population and industrialization in the Winchester Area and the location of Winchester on the ridgeline between the Licking and Kentucky River Basins combine to create rather difficult wastewater management problems. The need for additional investigations and refinement of the water quality and modeling data bases is strongly indicated, along with continuing assessment of the social, political and economic impacts of alternative water quality management strategies . Also, the Winchester 201 Facilities Planning program should evaluate all possible alternatives for wastewater management.

Exhibit B-20.2t

LICKING RIVER BASIN

SEGMENT 20 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	12468	13531	14890	19759
RURAL	2988	3055	3174	6756
FARM	1279	1306	1356	2795
NON-FARM	1708	1748	1817	3960
URBAN	9480	10476	11716	13003
HOUSING UNITS				
TOTAL	4379	4869	5508	7774
RURAL	956	1001	1067	2473
URBAN	3422	3868	4440	5295
EMPLOYMENT				
TOTAL	5559	6825	8085	10195
MANUFACTURING	2013	2430	2840	3333
NON-MANUFACTURING	3545	4394	5245	6862
LAND USE				
TOTAL	81	81	81	81
RURAL	76	76	76	76
AGRICULTURE	75	75	75	75
SILVICULTURE	1	1	1	1
MINING	0	0	0	0
URBAN	5	5	5	5

Exhibit B-20.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05107	Winchester Town Branch STP	UT - Strodes Cr./Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/ 22.1/2.6	0020052	Trickling Filter	0	2.17	52	39	25
05108	Rockwell Inter-national	UT - Hancock Cr./Strodes Cr./Stoner Cr./S. Fk. Licking/ 511.2/51.7/65.1/29.85/ 20.5/4.35/0.3	N.I.	Extended Aeration with Tertiary Lagoon	.232	0.028	4.0	5.0	2.7
05109	Colony Mobile Home Village	UT - UT - Hancock Cr./ Strodes Cr./Stoner Cr./ S. Fk. Licking/Licking River 511.2/51.7/65.1/29.85/20.5/ 4.8/1.05/0.35	N.I.	Conven-tional Aeration & Lagoon	0	0.03	15	10	10
05110	Tomlinson Lumber Co.	UT - Strodes Cr./Stoner Cr./ S. Fk. Licking River 511.2/51.7/65.1/29.85/22.1/ 2.2	N.I.	Extended Aeration	2.711	0.0015	40	40	10
05111	Glenway Nursing Home	Strodes Cr./Stoner Cr./ S. Fk. Licking 511.2/51.7/65.1/29.85/ 23.86	N.I.	Extended Aeration	.025	0.004	40	40	10
05112	I-64 East Bound Rest Area	UT - Hoods Cr./Strodes Cr./ Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/ 19.25/4.9/1.1	0025497	Extended Aeration	0	0.0024	40	40	10
05113	East KY Rural Electric Corp.	Hancock Cr./Strodes Cr./ Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/29.8/20.5/ 5.8	N.I.	Extended Aeration	.077	0.0072	20	25	5
05114	Clark Co. Maintenance Bldg.	Hoods Cr./Strodes Cr./ Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/19.25 4.4	0025674	Extended Aeration	.004	0.001	20	25	5
05115	Red Barn Dinner Theatre	Hancock Cr./Strodes. Cr./ Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/29.85/20.5 7.6	N.I.	Extended Aeration	0	0.0028	40	40	10
05116	Judianna Estates Trailer Park	Hancock Cr./Strodes Cr./ Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/29.85/20.5/ 4.95	N.I.	Extended Aeration & Lagoon	.095	0.004	20	20	10
05117	Winchester Plaza Shopping Center	Strodes Cr./Stoner Cr./ S. Fk. Licking 511.2/51.7/65.1/29.8/24.2	N.I.	Extended Aeration	0	0.014	40	40	10
05118	Rockwell Village Mobile Homes	Hancock Cr./Strodes Cr./ Stoner Cr./S. Fk. Licking/ Licking River 511.2/51.7/65.1/29.85/20.5/ 4.7	N.I.	Extended Aeration & Lagoon	.142	0.032	20	20	5
05119	Verna Hills Subdivision	UT - Hancock Cr./Strodes Cr./Stoner Cr./S. Fk. Licking/Licking River 511.2/51.7/65.1/29.85/20.5 6.9/1.45	N.I.	Extended Aeration & Lagoon	0	0.016	14	10	5
05185	Winchester Strodes Cr. STP	Strodes Cr./Stoner Cr./ S. Fk. Licking 511.2/51.7/65.1/29.85/22.1	0020052	Rotating Biological Contactors	2.974	0	15	10	1.5
05186	Freeman Corp.	UT - Strodes Cr./Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/22.1/ 2.4	N.I.	Extended Aeration	2.708	0.0020	40	40	10

Exhibit B-20.4t - Existing Point Source Discharge Characteristics - Licking River

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05187	Rockwell International	UT - Hancock Cr./Strodes Cr./Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/ 20.5/4.35/0.5	N.I.	----------	0	0.15	---	---	---
05188	Rockwell International	UT - Hancock Cr./Strodes Cr./Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/ 20.5/4.35/0.4	N.I.	Special Treatment & Sand Filter & Lagoon	0	0.010	20	10	5
05189	GTE Sylvania, Inc.	UT - UT - Strodes Cr./ Stoner Cr./S. Fk. Licking 511.2/51.7/65.1/29.85/22.1/ 2/1.8	0002615	----------	0	0.149	---	---	---

Exhibit B-20.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
05107	Winchester Town Branch STP	145.95 BOD	1.75	10/95%	10/96%	1/96%	8	5764.5 Bb
05108	Rockwell International	5.84 BOD	0.035	20/90%	20/92%	15/40%	4	--------
05109	Colony Mobile Home Village	2.25 BOD	0.027	10/95%	10/96%	1/96%	8	--------
05110	Tomlinson Lumber Co.	0.38 BOD	0.0015	30/85%	30/88%	20/20%	4	--------
05111	Glenway Nursing Home	0.67 BOD	0.004	20/90%	20/92%	15/40%	4	--------
05112	I-64 East Bound Rest Area	0.23 BOD	0.0027	10/95%	10/96%	1/96%	8	--------
05113	East KY Rural Electric Coop	2.03 BOD	0.0081	30/85%	30/88%	20/20%	4	--------
05114	Clark Co. Maintenance Bldg.	0.08 BOD	0.001	10/95%	10/96%	1/96%	4	--------
05115	Red Barn Dinner Theatre	0.27 BOD	0.0052	10/95%	10/96%	1/96%	8	--------
05116	Judianna Estates Trailer Park	1.00 BOD	0.004	30/85%	30/88%	21/20%	4	--------
05117	Winchester Plaza Shopping Center	1.33 BOD	0.016	10/95%	10/96%	1/96%	8	--------
05118	Rockwell Village Mobile Homes	3.00 BOD	0.036	10/95%	10/96%	1/96%	4	--------
05119	Verna Hills Subdivision	4.17 BOD	0.050	10/95%	10/96%	1/96%	8	--------
05185	Winchester Strodes Cr. STP	62.55 BOD	0.75	10/95%	10/96%	1/96%	4	--------
05186	Freeman Corp.	0.50 BOD	0.0020	30/85%	30/88%	20/20%	4	--------
05187	Rockwell International	N.A.	------	------	------	------	------	--------
05188	Rockwell International	3.00 BOD	0.012	30/85%	30/88%	20/20%	4	--------
05189	GTE Sylvania, Inc.	N.A.	------	------	------	------	------	--------
	Segment 20	233.25 BOD						2153.2

Exhibit B-20.6t - Municipal Needs - Licking River Basin

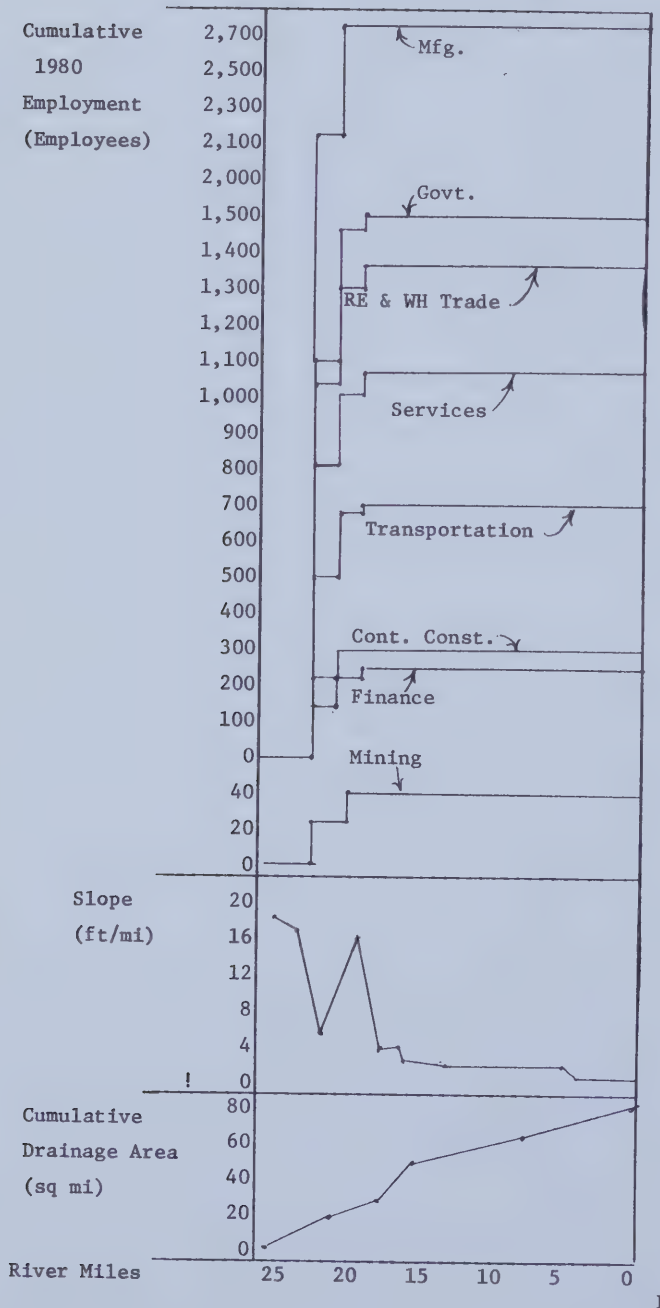
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05107	Winchester			1977
	Treatment	T4B	1,150,000	
	Interceptors	N.A.	87,000	
	Collectors	N.A.	2,830,000	

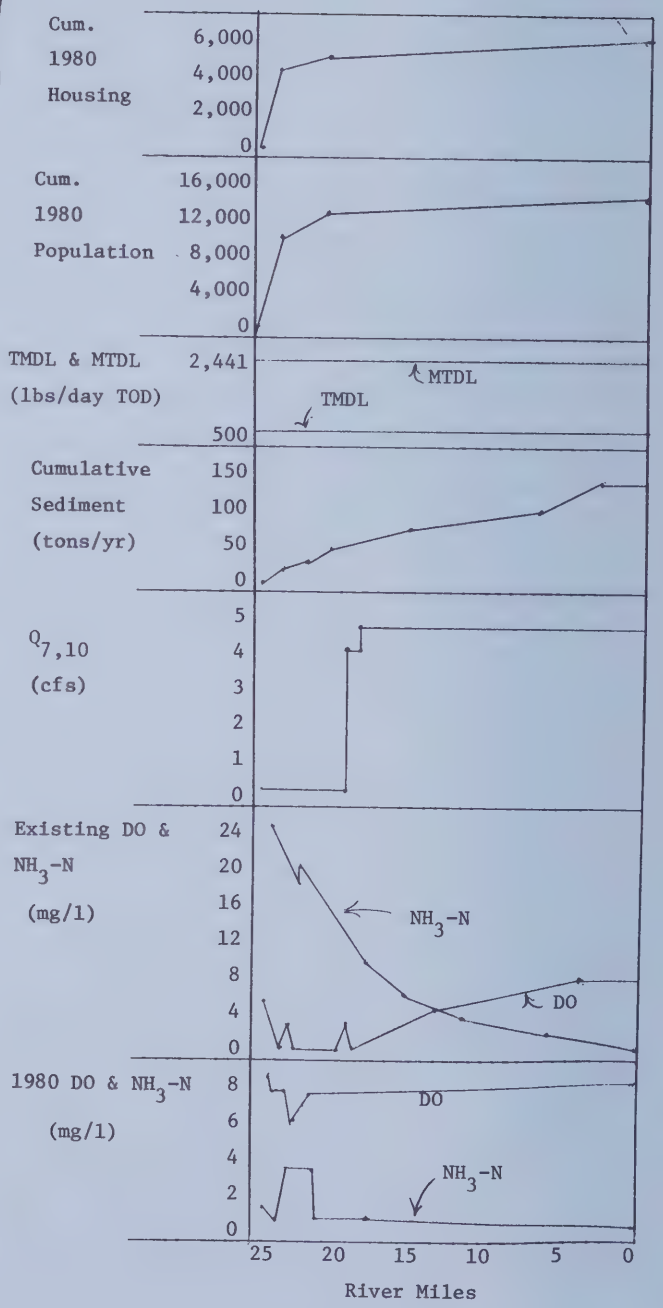
Exhibit B-20.1g Licking River Basin

Segment No. 20 Upstream Segment: --

Downstream Segment: 18

Mainstem: Strodes Creek





SEGMENT NO. 21 ANALYSIS

Classification: EL Priority: 101.6

Description

The location of Segment No.21 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-21 .1g. The former map shows the relative position of Segment No. 21 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 21 is listed in Exhibit B-21.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 21 (population, housing units, employment, and land use) are presented in Exhibit B- 21.2t and profiles of 1980 data are presented in Exhibit B-21 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 50 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-21.1g. The 7 day Q_{10} flow of 56.5 cfs at the upstream of the segment (RM 71.4) increases to 58 cfs at the downstream (RM 51.7). The total flow augmentation within the Segment is 50 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 21.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 21.3t) with which to document the historical record of standards contraventions in Segment 21.

Point and Nonpoint Source Discharges

The point source discharge in Segment 21 is listed and characterized in Exhibit B- 21.4t. The total waste flows from the point source is 0 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 21.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 21 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 21.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0 lb/day of TOD) is compared with the maximum theoretical load of 22.578 lb/day of TOD. The segment priority assigned to Segment 21 is 101.6.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 21 are presented in Exhibit B- 21.6t.

Segment Strategems

Segment No. 21 encompasses the main stem of the Licking River between its confluences with the North and South Forks. There are no urbanized areas or point sources located in the segment. Because of the relatively high 7 day Q_{10} in the Licking River through Segment No. 21, there exists considerable unutilized assimilative capacity as evidenced by the difference between the MTDL and TMDL for the Segment.

Exhibit B-21.2t

LICKING RIVER BASIN

SEGMENT 21 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1619	1672	1739	1884
RURAL	966	971	982	1056
FARM	580	583	589	633
NON-FARM	386	388	393	423
URBAN	653	700	756	828
HOUSING UNITS				
TOTAL	592	622	662	767
RURAL	346	355	366	422
URBAN	245	267	295	345
EMPLOYMENT				
TOTAL	312	345	380	388
MANUFACTURING	57	63	69	68
NON-MANUFACTURING	255	282	310	319
LAND USE				
TOTAL	50	50	50	50
RURAL	50	50	50	50
AGRICULTURE	32	32	32	32
SILVICULTURE	17	17	17	17
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-21.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
NO DISCHARGES IN THIS SEGMENT.									

Exhibit B-21.5t - Waste Load Allocations (1980) - Licking River Basin

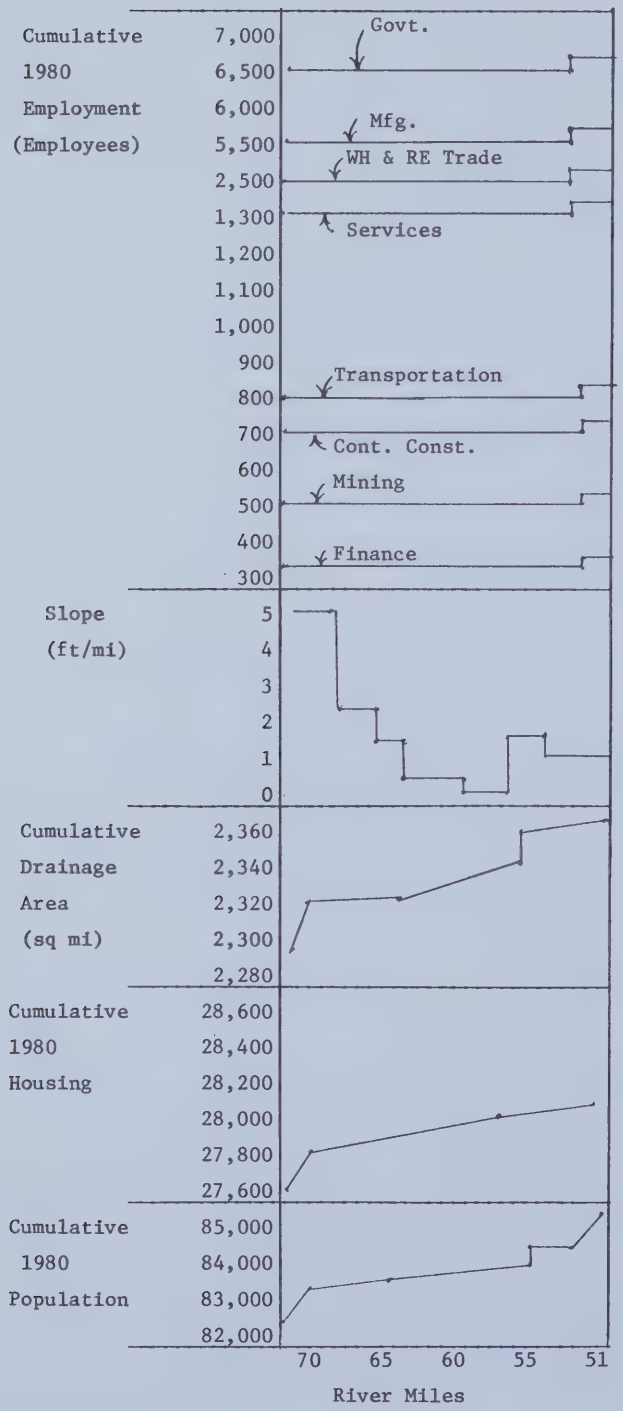
Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
NO DISCHARGERS IN THIS SEGMENT.								

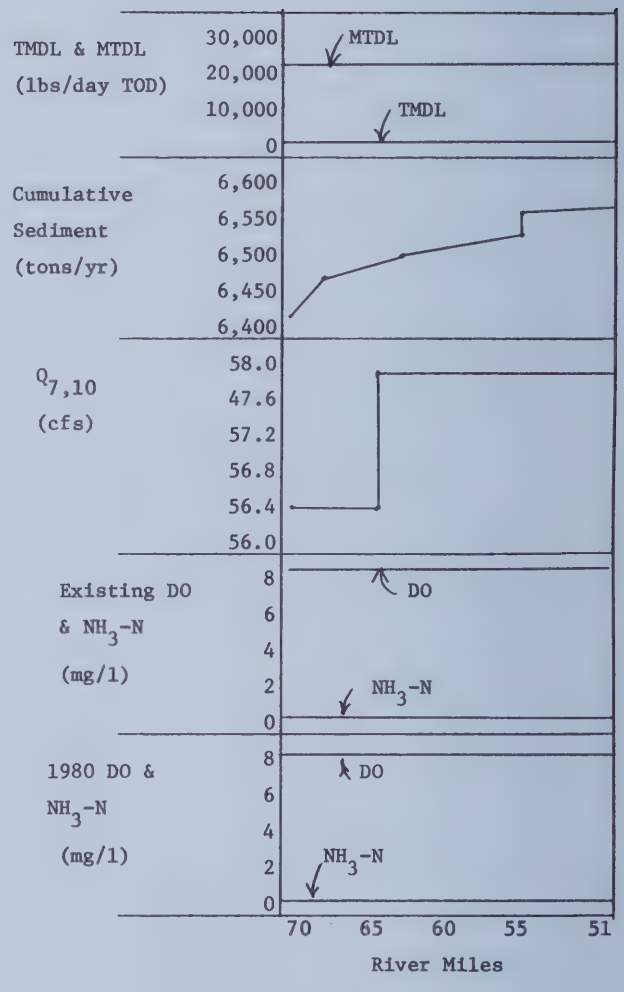
Exhibit B-21.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

Segment No. 21
Upstream Segments: 28
Downstream Segment: 2
Mainstem: Licking River

Exhibit B-21.1g Licking River Basin





SEGMENT NO. 22 ANALYSIS

Classification: WQL Priority:126.2

Description

The location of Segment No. 22 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-22 .1g. The former map shows the relative position of Segment No. 22 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 22 is listed in Exhibit B-22.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 22 (population, housing units, employment, and land use) are presented in Exhibit B- 22.2t and profiles of 1980 data are presented in Exhibit B-22 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. Oak Haven Subd. - Domestic - RM 4.6

This Segment encompasses 15 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-22.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 10.9) increases to .70 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B-22 .1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 22.3t) with which to document the historical record of standards contraventions in Segment 22 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 22 is listed and characterized in Exhibit B- 22.4t. The total waste flows from the point source is .04 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B-22 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 22 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 22.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (7.51 lb/day of TOD) is compared with the maximum theoretical load of 19 lb/day of TOD. The segment priority assigned to Segment 22 is 126.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 22 are presented in Exhibit B-22 .6t.

Segment Strategems

Segment No. 22 includes the entire Blanket Creek Basin. There is little development in the segment and the entire flow on the segment during low flow conditions is provided by the single waste discharge. The relatively small difference between TMDL and MTDL (8.5 lbs/day of TOD) indicates that little excess assimilative capacity is available in the segment.

Exhibit B-22.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 22 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	303	306	312	339
RURAL	303	306	312	339
FARM	177	179	182	198
NON-FARM	126	127	129	141
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	113	117	122	141
RURAL	113	117	122	141
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	14	14	14	14
RURAL	14	14	14	14
AGRICULTURE	8	8	8	8
SILVICULTURE	6	6	6	6
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-22.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05121	Oak Haven Subdivision	UT - Blanket Cr./ Licking River 511.2/55.6/4.64/0.2	N.I.	Extended Aeration	0	0.04	40	40	10

Exhibit B-22.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05121	Oak Haven Subdivision	3.75 BOD	0.045	10/95%	10/96%	1/96%	8	--------
	Segment 22	3.75 BOD						126.2

Exhibit B-22.6t - Municipal Needs - Licking River Basin

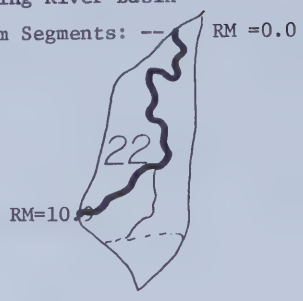
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

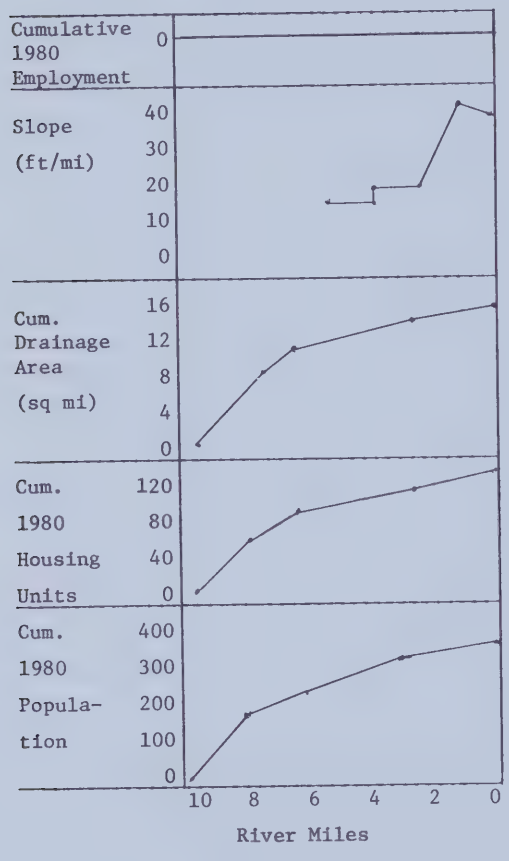
Exhibit B-22.1g Licking River Basin

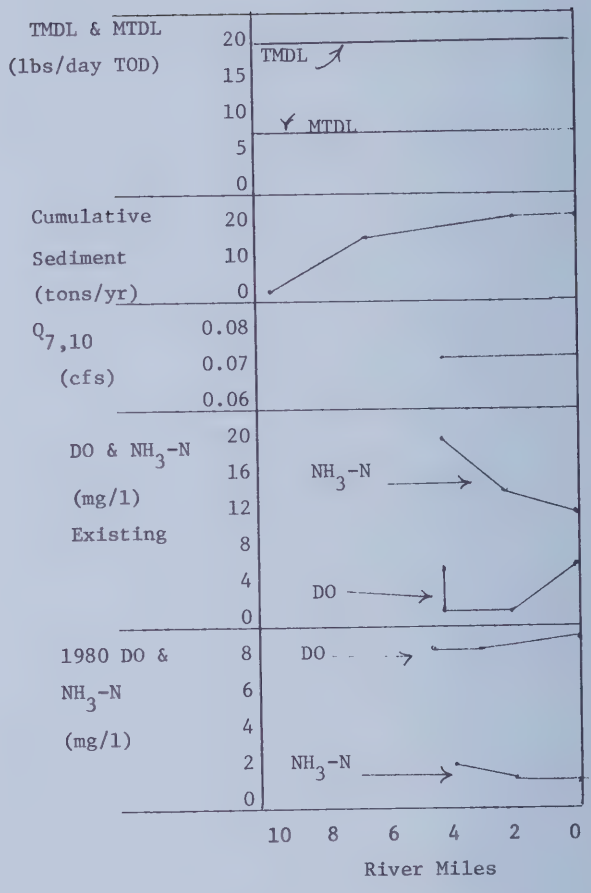
Segment No. 22 Upstream Segments: -- RM =0.0

Downstream Segment = 21

Mainstem: Blanket Creek







SEGMENT NO. 23 ANALYSIS

Classification: WQL Priority:106.1

Description

The location of Segment No. 23 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-23 .1g. The former map shows the relative position of Segment No. 23 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 23 are listed in Exhibit B-23.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 23 (population, housing units, employment, and land use) are presented in Exhibit B- 23.2t and profiles of 1980 data are presented in Exhibit B- 23.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 174 square miles of which .6 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-23.1g. The 7 day Q_{10} flow of .014 cfs at the upstream of the segment (RM 51.7) increases to .022 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 23.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 23.3t) with which to document the historical record of standards contraventions in Segment 23 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 23 are listed and characterized in Exhibit B- 23.4t. The total waste flows from the point sources is .0017 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 23.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 23 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 23.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.30 lb/day of TOD) is compared with the maximum theoretical load of 24 lb/day of TOD. The segment priority assigned to Segment 23 is 106.1.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 23 are presented in Exhibit B- 23.6t.

Segment Strategems

Segment No. 23 encompasses the lower half of the North Fork of the Licking River. Though relatively large in area, there is little development and only three small point dischargers. The entire low flow in the segment is provided by waste discharges either in this or upstream segments with resulting little unused assimilative capacity available.

Exhibit B-23.2t

LICKING RIVER BASIN

SEGMENT 23 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	5225	5172	5119	5044
RURAL	4510	4445	4368	4286
FARM	2394	2305	2331	2325
NON-FARM	2116	2079	2037	1961
URBAN	715	727	750	757
HOUSING UNITS				
TOTAL	1839	1858	1883	1997
RURAL	1551	1560	1568	1658
URBAN	287	298	314	338
EMPLOYMENT				
TOTAL	362	469	569	788
MANUFACTURING	163	230	289	383
NON-MANUFACTURING	199	238	279	404
LAND USE				
TOTAL	173	173	173	173
RURAL	172	172	172	172
AGRICULTURE	143	143	143	143
SILVICULTURE	29	29	29	29
MINING	0	0	0	0
URBAN	1	1	1	1

Exhibit B-23.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05120	Mt. Olivet School	Little Panther Cr./Panther Cr./No. Fk. Licking/ Licking River 511.2/71.4/27.8/0.9/4.0	N.I.	Septic Tank & Sand Filter	0	0.0004	50	25	25
05122	Highway Maintenance Hdqrs.	UT - UT - Camp Cr./Willow Br./No. Fk. Licking/ Licking River 511.2/71.4/18.1/1.07/3.9/ 1.8/0.5	0025569	Extended Aeration	0	0.0008	40	40	10
05123	W. H. Cartwill Residence	UT - Wells Cr./No. Fk. Licking/Licking River 511.2/71.4/44.7/2.5/1.5	N.I.	Extended Aeration	0	0.0005	40	40	10

Exhibit B-23.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05120	Mt. Olivet School	0.03 BOD	0.0004	10/95%	10/96%	1.96%	8	--------
05122	Highway Maintenance Hdqrs.	0.08 BOD	0.0009	10/95%	10/96%	1.96%	8	--------
05123	W. H. Cartwill Residence	0.04 BOD	0.0005	10/95%	10/96%	1.96%	8	--------
	Segment 23	0.15 BOD						106.1

Exhibit B-23.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

Exhibit B-23.1g Licking River Basin

Segment No. 23 Upstream Segments: 26
Downstream Segment: 21 Mainstem: North Fork - Licking

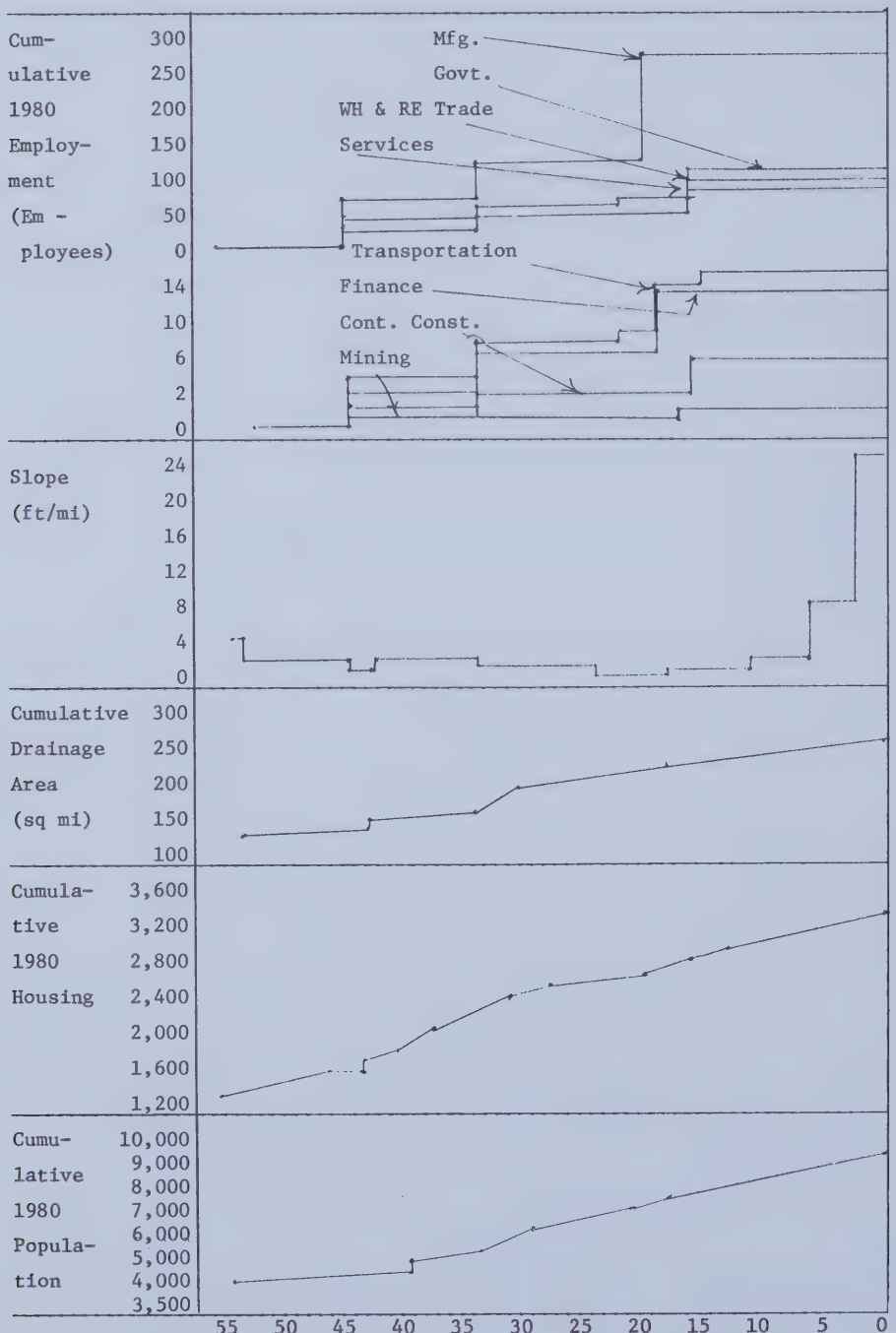
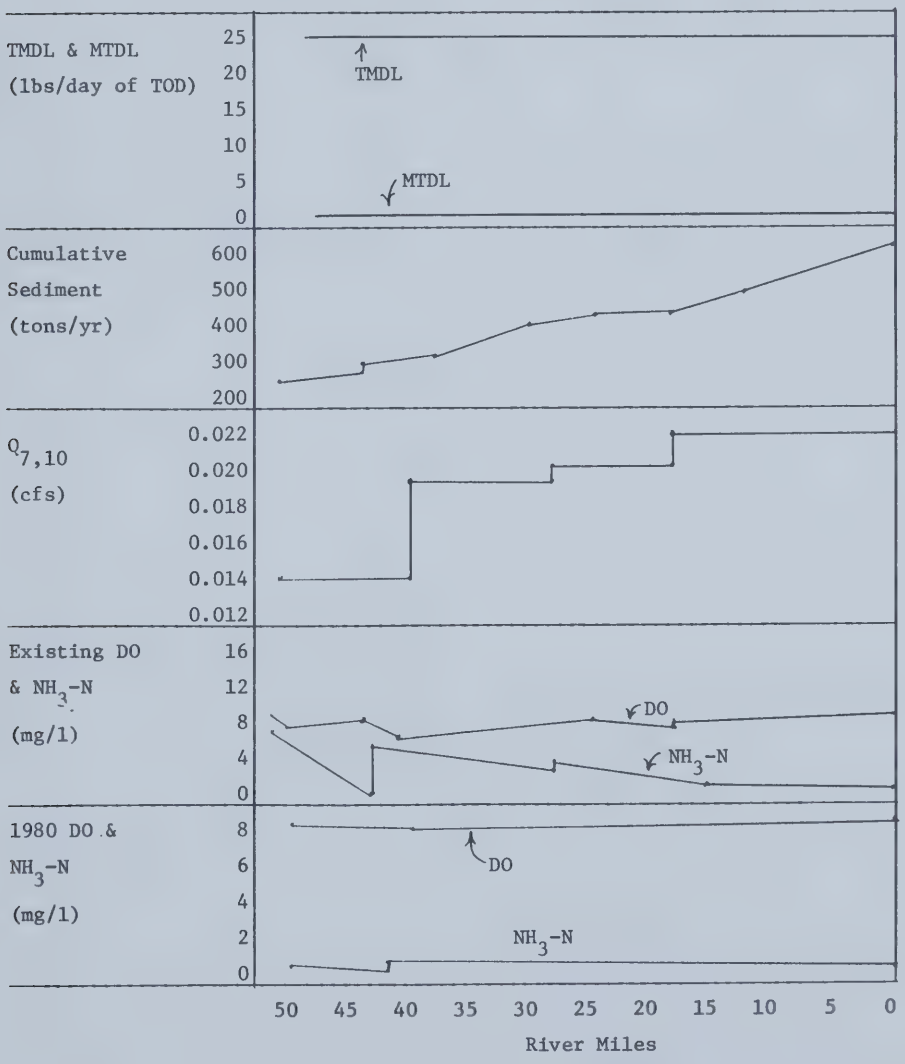


Exhibit B-23.1g Licking River Basin

Segment No. 23 Upstream Segment: 26

Downstream Segment: -- Mainstem: North Fork, Licking



SEGMENT NO. 24 ANALYSIS

Classification: WQL Priority: 102.4

Description

The location of Segment No. 24 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-24 .1g. The former map shows the relative position of Segment No. 24 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 24 is listed in Exhibit B-24.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 24 (population, housing units, employment, and land use) are presented in Exhibit B-24 .2t and profiles of 1980 data are presented in Exhibit B- 24.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. None

This Segment encompasses 10 square miles of which 10 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-24.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 6.9) increases to .006 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 24.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 24.3t) with which to document the historical record of standards contraventions in Segment 24.

Point and Nonpoint Source Discharges

The point source discharge in Segment 24 is listed and characterized in Exhibit B- 244t. The total waste flows from the point source is .003 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 24.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 24 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 24.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0.6 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 24 is 102.4.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 24 are presented in Exhibit B- 24.6t.

Segment Strategems

Segment No. 24 is comprised of the Lee's Creek Basin. There is little development in the segment and only one discharger which provides the entire low flow from the segment. Because of the lack of low flow dilution water in the Segment, and the steep slope of the main stem stream profile, the assimilative capacity of the Segment, as measured by MTDL, is essentially nonexistent.

Exhibit B-24.2t

LICKING RIVER BASIN

SEGMENT 24 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	277	268	258	224
RURAL	277	268	258	224
FARM	121	117	112	98
NON-FARM	156	151	145	126
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	93	92	91	88
RURAL	93	92	91	88
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	10	10	10	10
RURAL	9	9	9	9
AGRICULTURE	9	9	9	9
SILVICULTURE	0	0	0	0
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-24.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05124	Mayslick School	UT - Lees Cr./No. Fk. Licking/Licking River 511.2/71.4/42.1/4.8/0.4	N.I.	Extended Aeration	0	0.0032	40	40	10

Exhibit B-24.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05124	Mayslick School	0.30 BOD	0.0032	10/95%	10/96%	1/96%	8	--------
	Segment 24	0.30 BOD						102.4

Exhibit B-24.6t - Municipal Needs - Licking River Basin

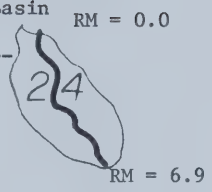
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

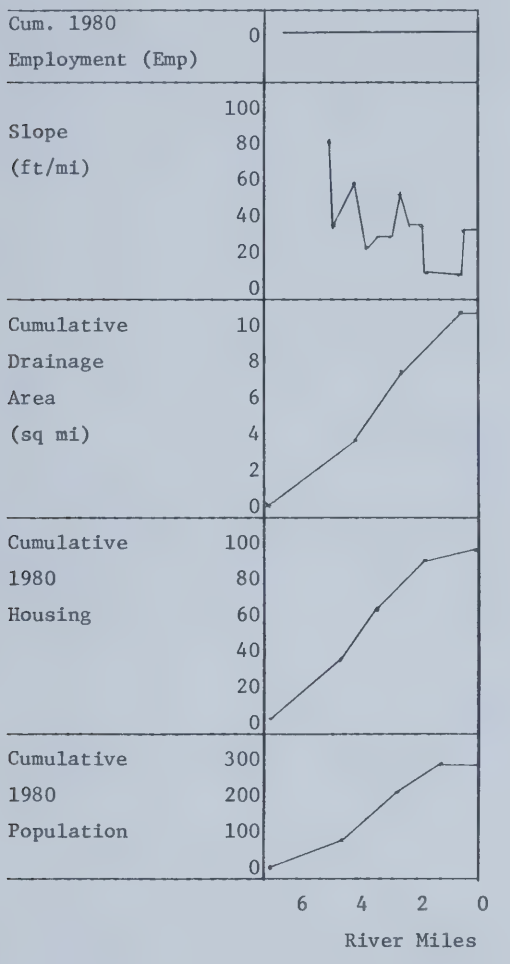
Exhibit B-24.1g Licking River Basin

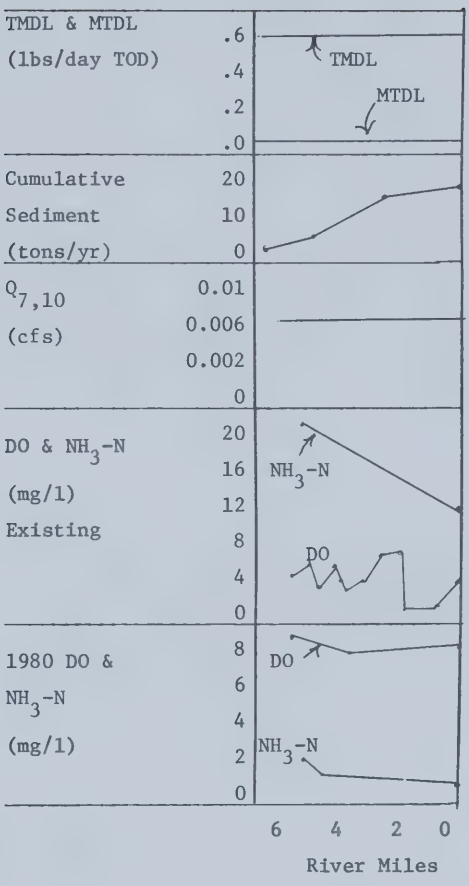
Segment No. 24 Upstream Segment:--

Downstream Segment: 23

Mainstem: Lee's Creek







SEGMENT NO. 25 ANALYSIS

Classification: WQL Priority: 101.1

Description

The location of Segment No. 25 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-25 .1g. The former map shows the relative position of Segment No. 25 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 25 is listed in Exhibit B-25.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 25 (population, housing units, employment, and land use) are presented in Exhibit B-25 .2t and profiles of 1980 data are presented in Exhibit B- 25.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 22 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-25.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 9.6) increases to .001 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B-25 .1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 25.3t) with which to document the historical record of standards contraventions in Segment 25 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 25 is listed and characterized in Exhibit B-25 .4t. The total waste flows from the point source is .001mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 25.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 25 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 25.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.15 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 25 is 101.1.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 25 are presented in Exhibit B- 25.6t.

Segment Strategems

Segment No. 25 is comprised of the Mill Creek Basin; a tributary to the North Fork of the Licking River. There is no urban development and only a single point discharger in the segment which provides the entire low flow in the stream. As indicated by the value of MTDL there is little assimilative capacity in the Segment.

Exhibit B-25.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 25 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	632	619	604	558
RURAL	632	619	604	558
FARM	307	302	295	275
NON-FARM	324	317	308	283
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	213	214	215	220
RURAL	213	214	215	220
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	22	22	22	22
RURAL	22	22	22	22
AGRICULTURE	21	21	21	21
SILVICULTURE	0	0	0	0
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-25.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05125	Mill Cr. Christian Church	Mill Cr./No. Fk. Licking/ Licking River 511.2/71.4/51.7/4.9	N.I.	Extended Aeration	0	0.0008	40	40	10

Exhibit B-25.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05125	Mill Creek Christian Church	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
	Segment 25	0.08 BOD						101.1

Exhibit B-25.6t - Municipal Needs - Licking River Basin

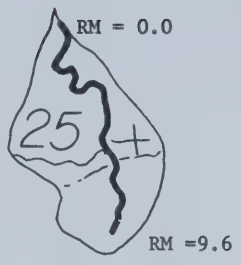
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

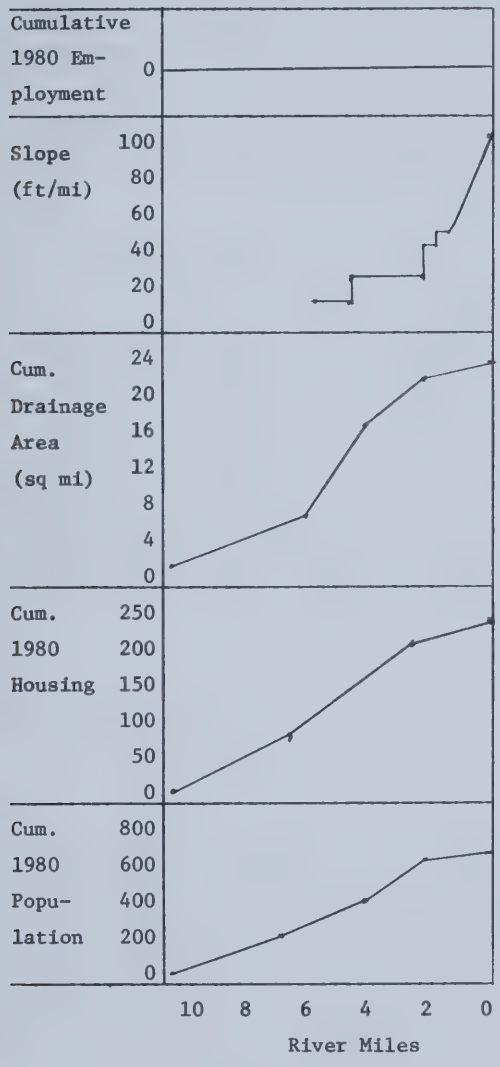
Exhibit B-25.1g Licking River Basin

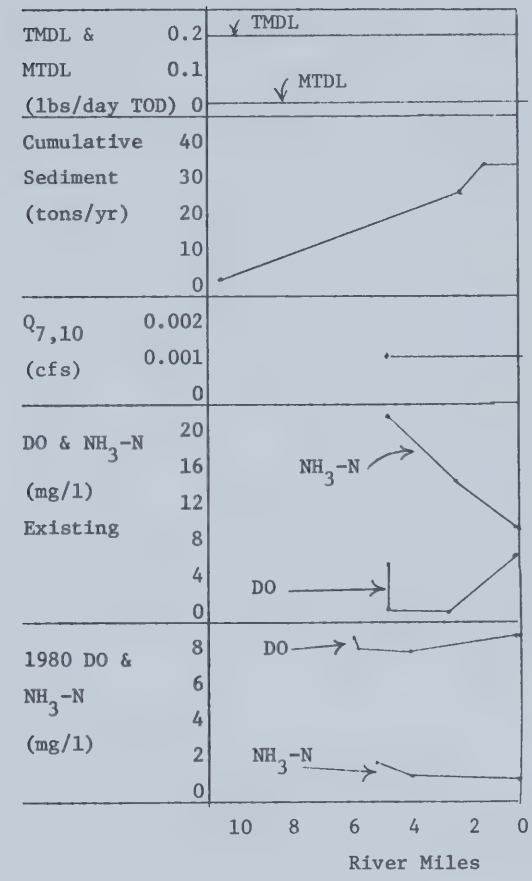
Segment No. 25 Upstream Segments:--

Downstream Segment: 23

Mainstem: Mill Creek







SEGMENT NO. 26 ANALYSIS

Classification: EL Priority: 102.8

Description

The location of Segment No.26 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-26 .1g. The former map shows the relative position of Segment No. 26 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 26 is listed in Exhibit B-26.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 26 (population, housing units, employment, and land use) are presented in Exhibit B- 26.2t and profiles of 1980 data are presented in Exhibit B- 26.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 87 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-26.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 84.8) increases to .13cfs at the downstream (RM 51.7). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 26.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 26.3t) with which to document the historical record of standards contraventions in Segment 26.

Point and Nonpoint Source Discharges

The point source discharge in Segment 26 is listed and characterized in Exhibit B- 26.4t. The total waste flows from the point source is 0 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 26.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 26 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 26.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0 lb/day of TOD) is compared with the maximum theoretical load of 2 lb/day of TOD. The segment priority assigned to Segment 26 is 102.8.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 26 are presented in Exhibit B- 26.6t.

Segment Strategems

Segment No. 26 is comprised of upper part of the North Fork of the Licking River. There are no dischargers located in this segment and the only flow during low flow conditions results from the discharge of a tributary stream, Stone Lick Branch (Segment No. 27). The low value of MTDL, 2 lbs/day of TOD, indicates that little available assimilative capacity is available in the Segment.

Exhibit B-26.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 26 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	2914	2860	2843	2722
RURAL	2914	2860	2843	2722
FARM	1680	1664	1647	1591
NON-FARM	1234	1216	1195	1131
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	970	986	1006	1074
RURAL	970	986	1006	1074
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	87	87	87	87
RURAL	87	87	87	87
AGRICULTURE	70	70	70	70
SILVICULTURE	16	16	16	16
MINING	0	0	0	0
WATER	0	0	0	0
URBAN	0	0	0	0

Exhibit B-26.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
NO DISCHARGES IN THIS SEGMENT.									

Exhibit B-26.5t - Waste Load Allocations (1980) - Licking River Basin

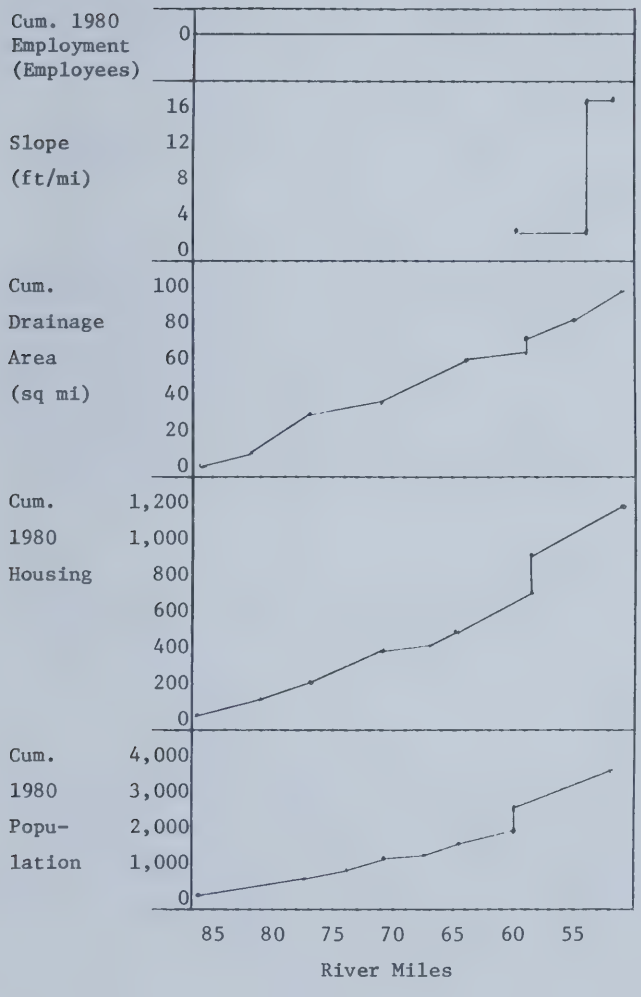
Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
NO DISCHARGERS IN THIS SEGMENT.								

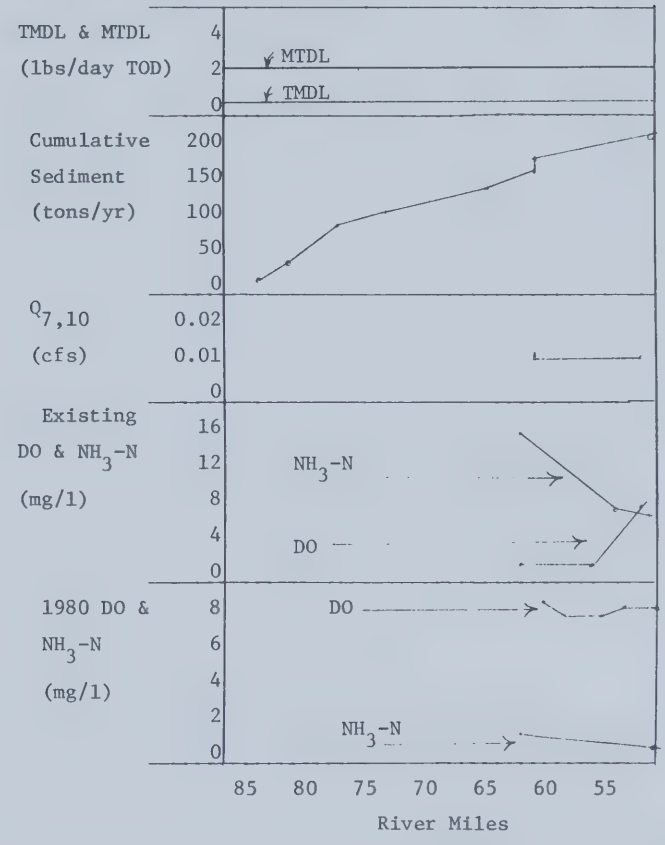
Exhibit B-26.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

Exhibit B-26.1g Licking River Basin

Segment No. 26 Upstream Segments: 00 Downstream Segment: 23 Mainstem: North Fork Licking





SEGMENT NO. 27 ANALYSIS

Classification: WQL Priority:105.2

Description

The location of Segment No. 27 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-27 .1g. The former map shows the relative position of Segment No. 27 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 27 are listed in Exhibit B- 27.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 27 (population, housing units, employment, and land use) are presented in Exhibit B- 27.2t and profiles of 1980 data are presented in Exhibit B- 27.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 8 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-27.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 4.8) increases to .13 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 27.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 27.3t) with which to document the historical record of standards contraventions in Segment 27 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 27 are listed and characterized in Exhibit B- 27.4t. The total waste flows from the point sources is .007 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 27.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 27 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 27.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.80 lb/day of TOD) is compared with the maximum theoretical load of 2 lb/day of TOD. The segment priority assigned to Segment 27 is 105.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 27 are presented in Exhibit B- 27.6t.

Segment Strategems

Segment No. 27, the Stone Lick Branch Basin, is tributary to the North Fork of the Licking River. The two small dischargers in the basin provide the entire flow from the segment during low flow conditions. There is little excess assimilative capacity within the stream as indicated by the small difference between MTDL and TMDL (1.2 lbs/day of TOD).

Exhibit B-27.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 27 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	503	495	487	461
RURAL	503	495	487	461
FARM	219	216	213	201
NON-FARM	283	279	274	260
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	158	159	162	170
RURAL	158	159	162	170
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	8	8	8	8
RURAL	8	8	8	8
AGRICULTURE	7	7	7	7
SILVICULTURE	0	0	0	0
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-27.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05126	Mitchell Trailer Park	UT - Stone Lick Br./No. Fk. Licking/Licking River 511.2/71.4/60.1/2.8/1.5	N.I.	Extended Aeration	0	0.004	40	40	10
05127	Orangeburg School	Stone Lick Br./No. Fk. Licking/Licking River 511.2/71.4/60.1/2	N.I.	Extended Aeration	.007	0.0032	40	40	10

Exhibit B-27.5t - Waste Load Allocations (1980) - Licking River Basin

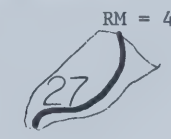
Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05126	Mitchell Trailer Park	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05127	Orangeburg School	0.30 BOD	0.0036	10/95%	10/96%	1/96%	4	--------
	Segment 27	0.68 BOD						105.2

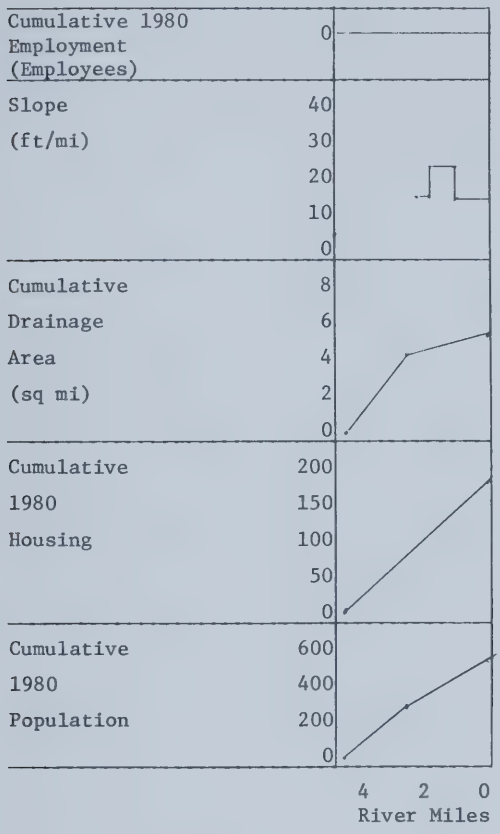
Exhibit B-27.6t - Municipal Needs - Licking River Basin

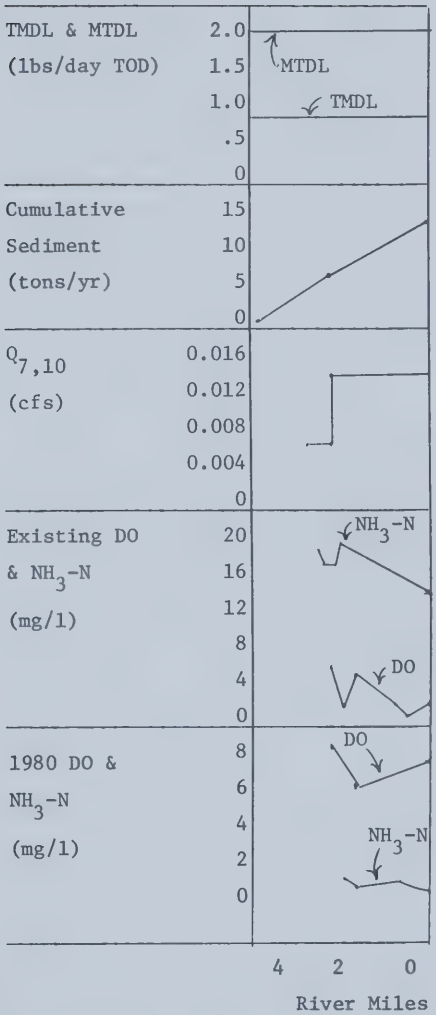
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

Exhibit B-27.1g Licking River Basin

Segment No. 27 Upstream Segments: -- Downstream Segments: 26 Mainstem: Stone Lick Branch







SEGMENT NO. 28 ANALYSIS

Classification: WQL Priority:345.7

Description

The location of Segment No. 28 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-28 .1g. The former map shows the relative position of Segment No. 28 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 28 are listed in Exhibit B-28.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 28 (population, housing units, employment, and land use) are presented in Exhibit B- 28.2t and profiles of 1980 data are presented in Exhibit B- 28.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. Nicholas Dog Meat Co. - Industrial - RM 103.1

This Segment encompasses 393 square miles of which .2 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-28.1g. The 7 day Q_{10} flow of 55.8 cfs at the upstream of the segment (RM 168.5) increases to 56.5 cfs at the downstream (RM 71.4). The total flow augmentation within the Segment is 50 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 28.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 28.3t) with which to document the historical record of standards contraventions in Segment 28.

Point and Nonpoint Source Discharges

The point source discharges in Segment 28 are listed and characterized in Exhibit B- 28.4t. The total waste flows from the point sources is .005 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 28.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 28 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 28.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (6.43 lb/day of TOD) is compared with the maximum theoretical load of 98.606 lb/day of TOD . The segment priority assigned to Segment is

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 28 are presented in Exhibit B- 28.6t.

Segment Strategems

Segment No. 28 encompasses the area tributary to a 96.9 mile stretch of the Licking River in the central part of the basin. Though there are several upstream segments that contain urbanization and industrial development, Segment No. 28 is largely undeveloped and contains only two small dischargers. The 7 day Q_{10} through the segment (55.8 cfs) is the reason for the excess assimilative capacity of 98,600 lbs/day of TOD in the Segment.

Exhibit B-28.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 28 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	10541	10476	10398	11020
RURAL	10039	10011	9976	10540
FARM	5999	5960	5958	6273
NON-FARM	4039	4030	4017	4267
URBAN	502	465	422	479
HOUSING UNITS				
TOTAL	3730	3768	3812	4309
RURAL	3519	3570	3628	4088
URBAN	210	198	183	220
EMPLOYMENT				
TOTAL	366	401	540	966
MANUFACTURING	16	77	126	269
NON-MANUFACTURING	350	323	414	697
LAND USE				
TOTAL	393	393	393	393
RURAL	392	392	392	392
AGRICULTURE	301	301	301	301
SILVICULTURE	90	90	90	90
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-28.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05092	Nicholas Dog Meat Co.	UT - Mint Cr./Licking River 511.2/103.1/1.83/0.35	N.I.	Lagoon	0	0.002	210	120	27
05129	Texas Eastern Transmission Co.	Little Indian Cr./Licking River 511.2/144/0.6	N.I.	Septic Tank & Sand Filter	0	0.0026	50	25	25

Exhibit B-28.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
05092	Nicholas Dog Meat Co.	0.17 BOD	0.002	10/95%	10/96%	1/96%	8	--------
05129	Texas Eastern Transmission Co.	0.22 BOD	0.0026	10/95%	10/96%	1/96%	8	--------
05---	Bath Co. Water District #2	22.52 BOD	0.09	30/85%	30/88%	20/20%	4	249.7 Ca
05---	Mt. Olivet	2.09 BOD	.025	10/95%	10/96%	1/96%	8	335.6 Ca
	Segment 28	25.00 BOD						345.7

Exhibit B-28.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05---	Mt. Olivet			1977
	Treatment	T4B	487,000	
	Collectors	N.A.	150,000	
05---	Bath County Water Dist. #2			1977
	Treatment	T1A	508,400	
	Interceptors	N.A.	558,775	
	Collectors	N.A.	654,770	

Exhibit B-28.1g Licking River Basin Segment No. 28 Upstream Segments: 36

Downstream Segment: 21 Mainstem: Licking River

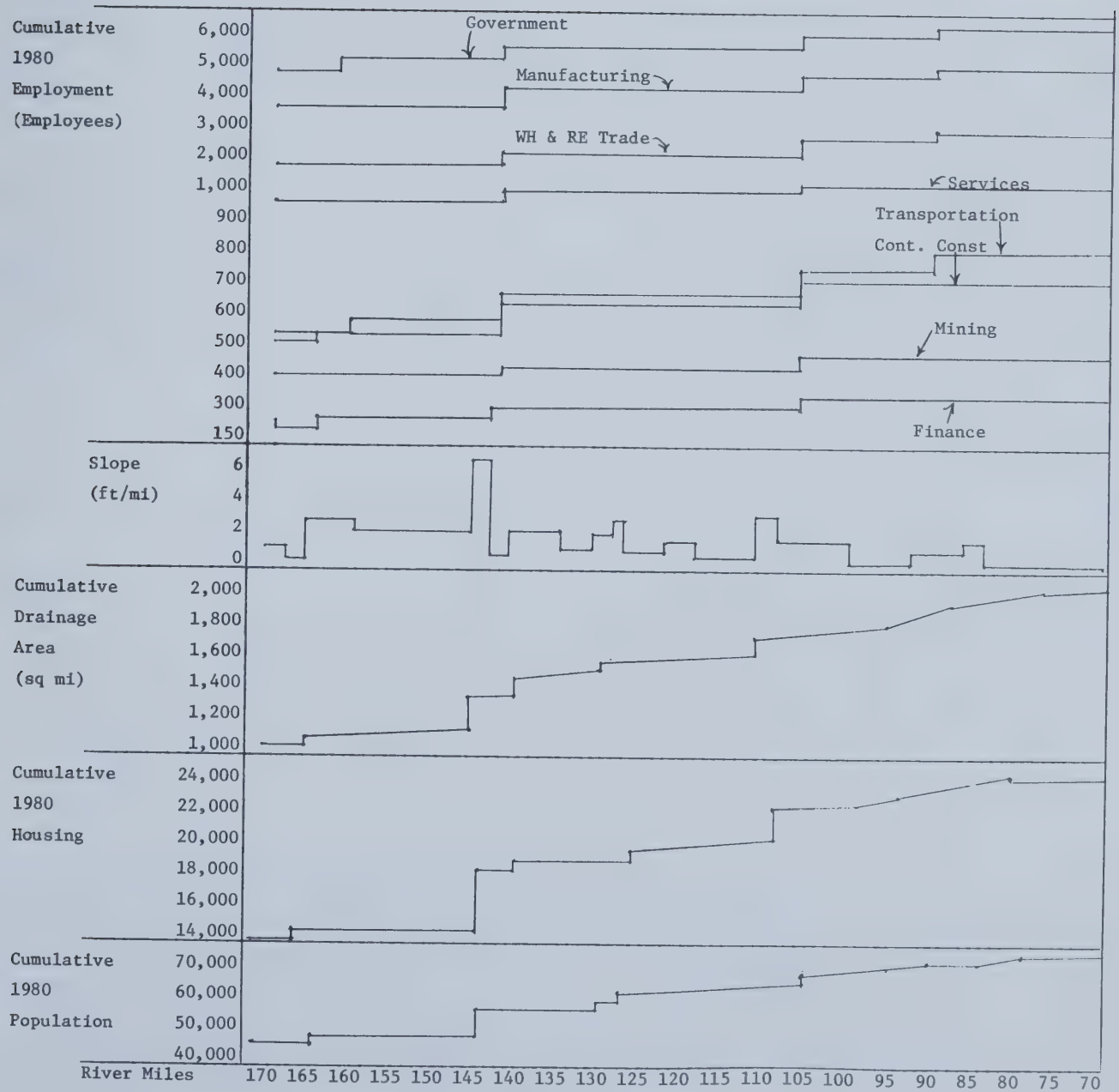
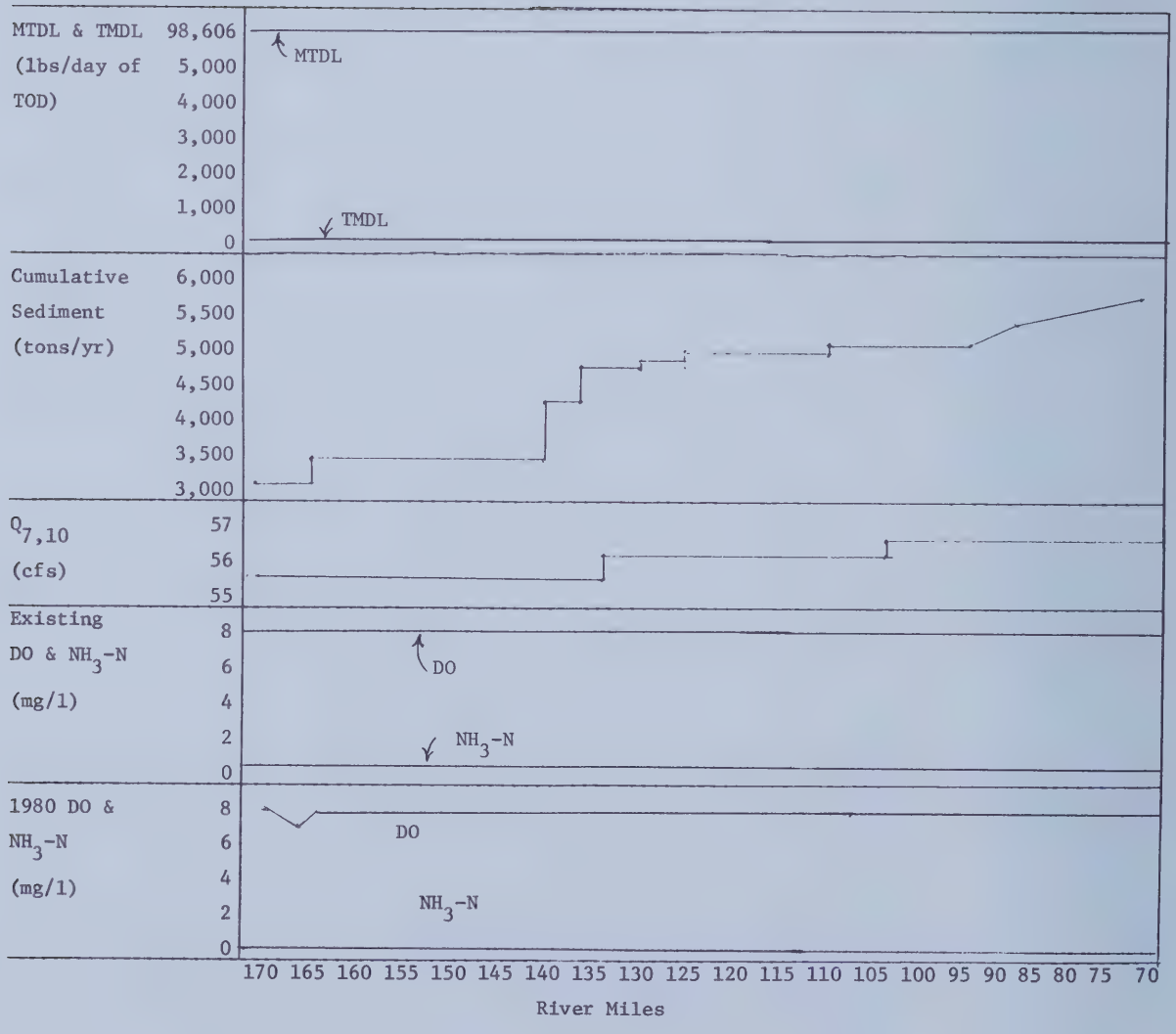


Exhibit B-28.1g Licking River Basin

Segment No. 28 Upstream Segments: 36 Downstream Segment: 21 Mainstem: Licking River



SEGMENT NO. 29 ANALYSIS

Classification: WQL Priority: 264.9

Description

The location of Segment No. 29 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-29 .1g. The former map shows the relative position of Segment No. 29 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 29 are listed in Exhibit B-29.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 29 (population, housing units, employment, and land use) are presented in Exhibit B- 29.2t and profiles of 1980 data are presented in Exhibit B-29 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Flemingsburg - Municipal - RM 25.9

This Segment encompasses 98 square miles of which 2. percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-29.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 39.7) increases to .339 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 29.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 29.3t) with which to document the historical record of standards contraventions in Segment 29 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 29 are listed and characterized in Exhibit B- 29.4t. The total waste flows from the point sources is .25 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 29.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 29 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 29.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (78 lb/day of TOD) is compared with the maximum theoretical load of 280 lb/day of TOD. The segment priority assigned to Segment 29 is 264.9.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 29 are presented in Exhibit B- 29.6t.

Segment Strategems

Segment No. 29 encompasses the Fleming Creek Basin. The major discharger in the segment is the Flemingsburg STP located on the Town Branch tributary to Fleming Creek. There are four additional industrial and domestic dischargers in the Segment, all in the Flemingsburg area, whose incorporation into a regional system should be investigated in the pending 201 Facilities planning effort. There are approximately 200 lbs/day of excess assimilative capacity in the segment.

Exhibit B-29.2t

LICKING RIVER BASIN

SEGMENT 29 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	5133	5112	5089	5182
RURAL	2637	2632	2626	2677
FARM	1576	1573	1569	1600
NON-FARM	1060	1058	1056	1076
URBAN	2496	2480	2462	2504
HOUSING UNITS				
TOTAL	1890	1927	1972	2194
RURAL	907	927	951	1059
URBAN	982	1000	1020	1135
EMPLOYMENT				
TOTAL	2226	2579	2899	3441
MANUFACTURING	750	976	1168	1419
NON-MANUFACTURING	1475	1602	1731	2022
LAND USE				
TOTAL	98	98	98	98
RURAL	97	96	96	96
AGRICULTURE	86	87	87	87
SILVICULTURE	8	8	8	8
MINING	0	0	0	0
URBAN	1	1	1	1

Exhibit B-29.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05130	Flemingsburg STP	Town Br./Fleming Cr./ Licking River 511.2/106.92/25.9/0.4	0021229	Trickling Filter	.014	0.20	40	40	20
05131	Carey-Adams	Fleming Cr./Licking River 511.2/106.92/20.65	0001554	Extended Aeration	.270	0.04	7	10	2.3
05132	Randall Co.	UT - Town Br./Fleming Cr./ Licking River 511.2/106.92/25.9/1/0.6	0001155	Lagoon	0	0.008	.05	5	15
05133	Richie Body Shop	Town Br./Fleming Cr./ Licking River 511.2/106.92/25.9/3.1	N.I.	Extended Aeration	0	0.004	40	40	10
05134	Whip & Sip Dairy Bar	UT - UT - Fleming Cr./ Licking River 511.2/106.92/23.6/0.9/1.0	N.I.	Extended Aeration	0	0.0008	40	40	10

Exhibit B-29.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05130	Flemingsburg STP	19.18 BOD	0.23	10/95%	10/96%	1/96%	8	424.6 Ca
05131	Carey Adams	7.51 BOD	0.045	20/90%	20/92%	15/40%	4	--------
05132	Randall Co.	0.75 BOD	0.009	10/95%	10/96%	1/96%	8	--------
05133	Richie Body Shop	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05134	Whip & Sip Dairy Bar	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
	Segment 29	27.9 BOD						264.9

Exhibit B-29.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
				1977
05130	Flemingsburg			
	Treatment	T4B	380,000	
	Collectors	N.A.	380,000	
	Infiltration & Inflow	N.A.	115,000	

Exhibit B-29.1g Licking River Basin

Segment No. 29 Upstream Segments: --

Downstream Segment: 28

Mainstem: Fleming Creek

RM=0.0

RM=39.7

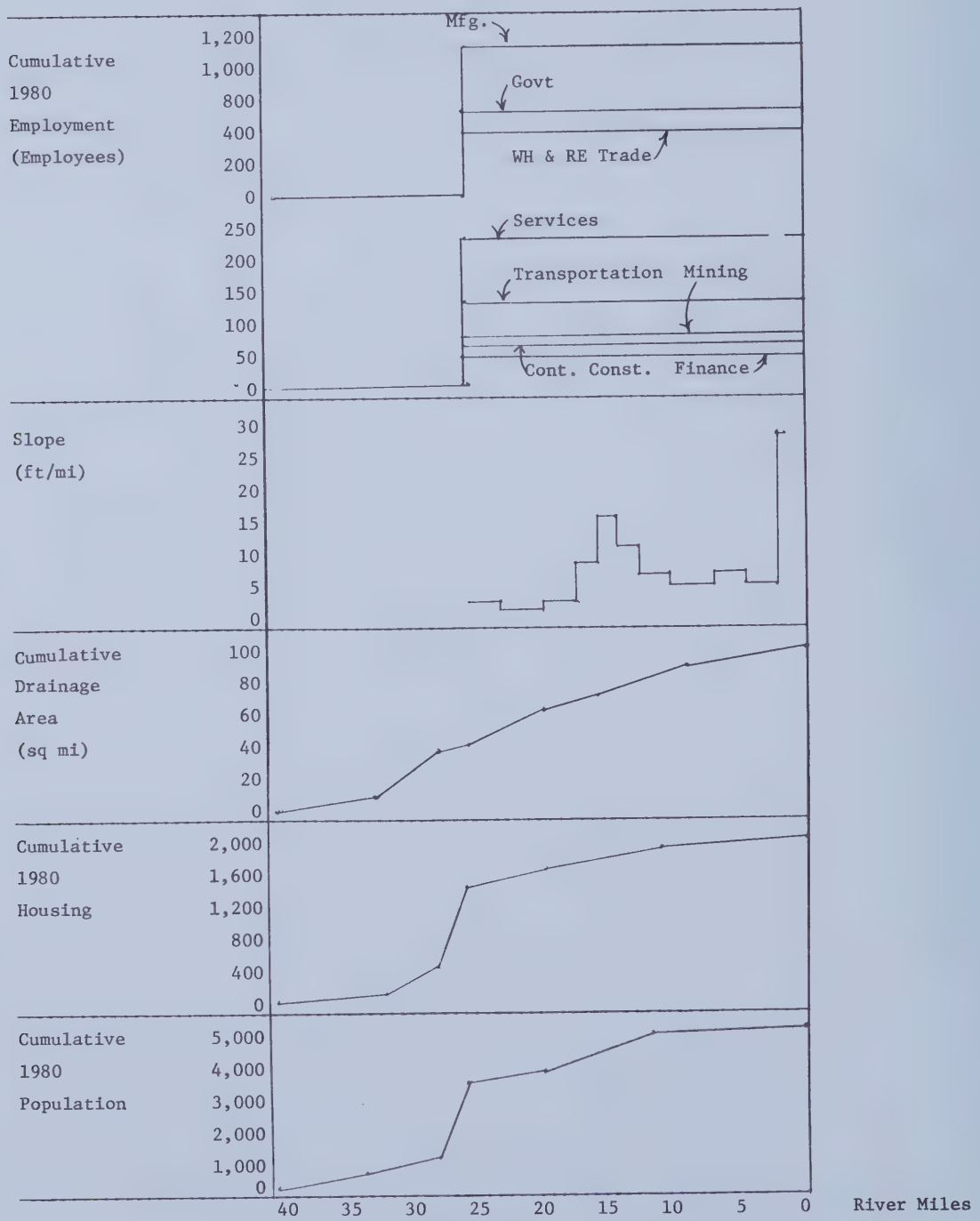
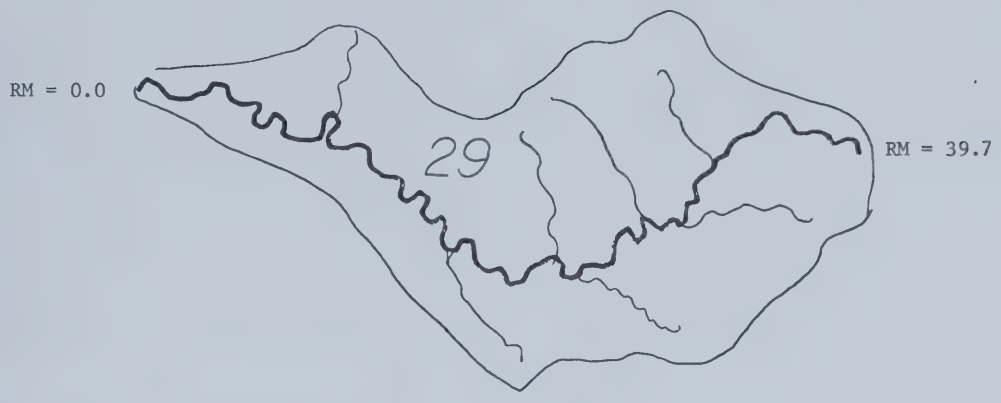
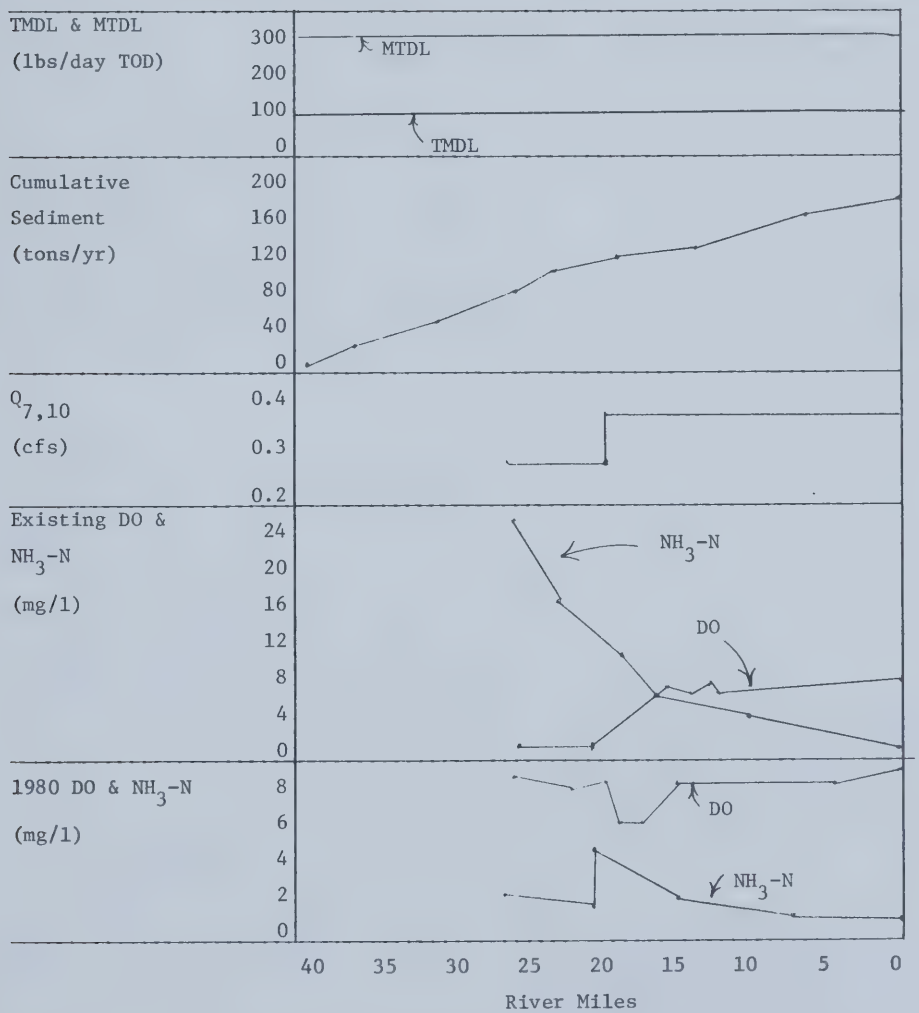


Exhibit B-29.1g Licking River Basin

Segment No. 29 Upstream Segments: -- Downstream Segment: 28 Mainstem: Fleming Creek





SEGMENT NO. 30 ANALYSIS

Classification: WQL Priority: 102.0

Description

The location of Segment No. 30 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-30 .1g. The former map shows the relative position of Segment No. 30 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 30 is listed in Exhibit B-30.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 30(population, housing units, employment, and land use) are presented in Exhibit B- 30.2t and profiles of 1980 data are presented in Exhibit B-30 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 33 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-30.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 11.7) increases to .003 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 30.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 30.3t) with which to document the historical record of standards contraventions in Segment 30.

Point and Nonpoint Source Discharges

The point source discharge in Segment 30 is listed and characterized in Exhibit B- 30.4t. The total waste flows from the point source is .002 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B-30 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 30 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 30.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.37 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 30 is 102.0.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 30 are presented in Exhibit B- 30.6t.

Segment Strategems

Segment No. 30 includes the Locust Creek - Hillsboro Branch Basin. There is only a single small discharger which provides the entire low flow in the segment, such that no excess assimilative capacity exists in the Basin.

Exhibit B-30.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 30 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	704	702	700	702
RURAL	704	702	700	702
FARM	420	419	418	419
NON-FARM	283	283	282	283
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	255	261	268	293
RURAL	255	261	268	293
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	32	32	32	32
RURAL	32	32	32	32
AGRICULTURE	27	27	27	27
SILVICULTURE	5	5	5	5
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-30.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05135	Hillsboro Elementary School	Ditch/Hillsboro Br./ Locust Cr./Licking River 511.2/130.9/5.7/3.4/0.3	N.I.	Extended Aeration	0	0.0020	40	40	10

Exhibit B-30.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
05135	Hillsboro Elementary School	0.18 BOD	0.0022	10/95%	10/96%	1/96%	8	--------
	Segment 30	0.18 BOD						102

Exhibit B-30.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

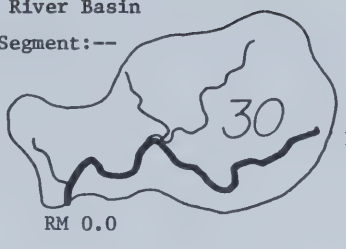
Exhibit B-30.1g Licking River Basin

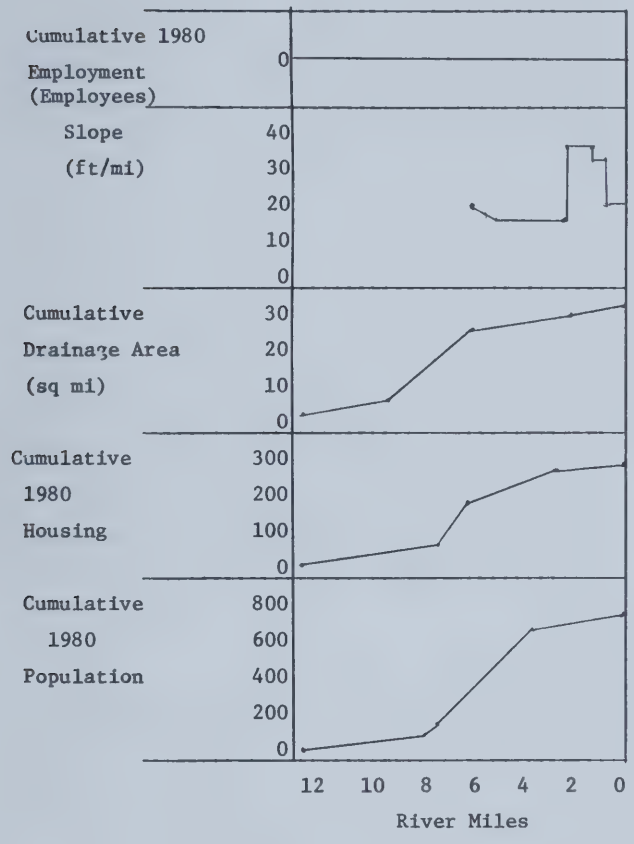
Segment No. 30 Upstream Segment:--

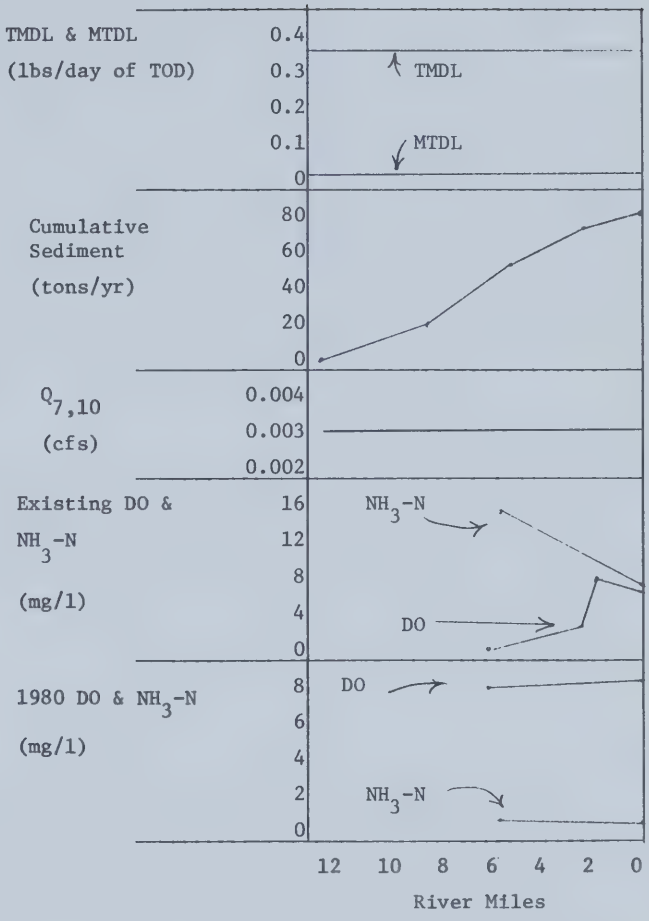
Downstream Segment: 28

Mainstem: Locust Creek

Hillsboro Branch







SEGMENT NO. 31 ANALYSIS

Classification: WQL Priority:109.1

Description

The location of Segment No.31 is shown in the Segment Map of Exhibit B-0.4m , and Exhibit B-31 .1g. The former map shows the relative position of Segment No. 31 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 31 are listed in Exhibit B-31.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 31 (population, housing units, employment, and land use) are presented in Exhibit B- 31.2t and profiles of 1980 data are presented in Exhibit B-31 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 118 square miles of which .8 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-31.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 25.8) increases to .014 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 31.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 31.3t) with which to document the historical record of standards contraventions in Segment 31 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 31 are listed and characterized in Exhibit B- 31.4t. The total waste flows from the point sources is .009 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 31.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 31 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 31.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (1.60 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 31 is 109.1.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 31 are presented in Exhibit B- 31.6t.

Segment Strategems

Segment 31, the Fox Creek Basin, contains little urbanized area and only two small point dischargers. There is little assimilative capacity in the segment due to the essentially nonexistant 7 day Q_{10} in this segment.

Exhibit B-31.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 31 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	2240	2234	2227	2232
RURAL	2240	2234	2227	2232
FARM	1337	1333	1329	1332
NON-FARM	902	900	897	899
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	766	782	802	880
RURAL	766	782	802	880
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	117	117	117	117
RURAL	117	117	117	117
AGRICULTURE	46	46	46	46
SILVICULTURE	71	71	71	71
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit 31.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05136	Fox Valley School	UT - Sandlick Cr./Fox Cr./ Licking River 511.2/141.15/15.85/2.35/0.15	N.I.	Septic Tank & Sand Filter	0	0.003	50	25	25
05137	Fox Creek Recreation Facilities	Sandlick Cr./Fox Cr./ Licking River 511.2/141.15/15.85/8.2	N.I.	Extended Aeration	0	0.0060	40	40	10

Exhibit B-31.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05136	Fox Valley School	0.25 BOD	0.003	10/95%	10/96%	1/96%	8	--------
05137	Fox Creek Recreation Facilities	0.57 BOD	0.0068	10/95%	10/96%	1/96%	8	--------
	Segment 31	0.79 BOD						109.1

Exhibit B-31.6t - Municipal Needs - Licking River Basin

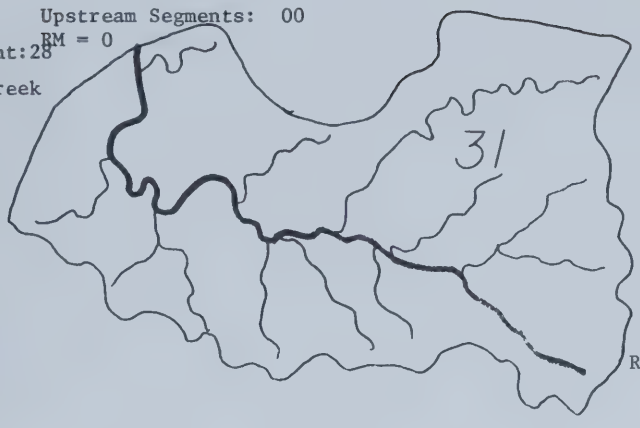
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

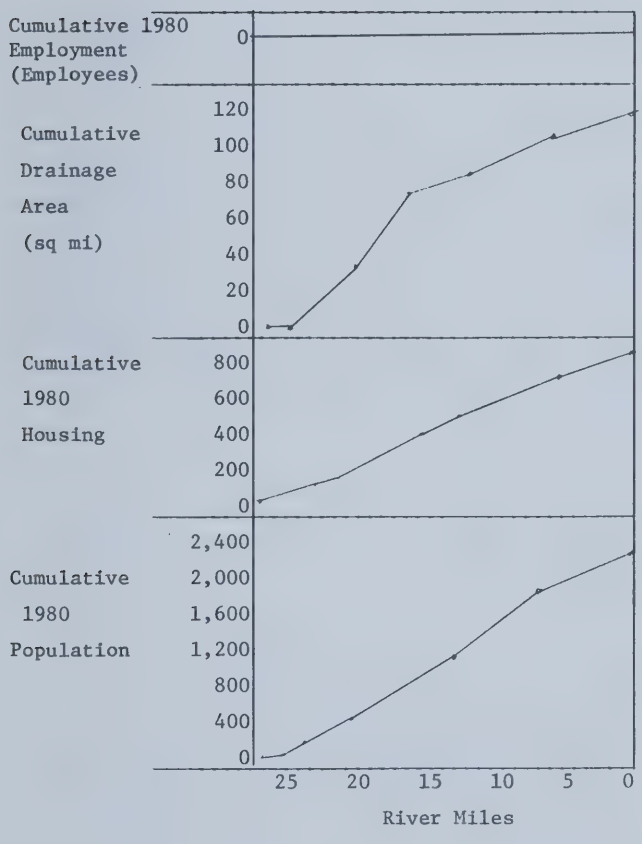
Exhibit B-31.1g Licking River Basin

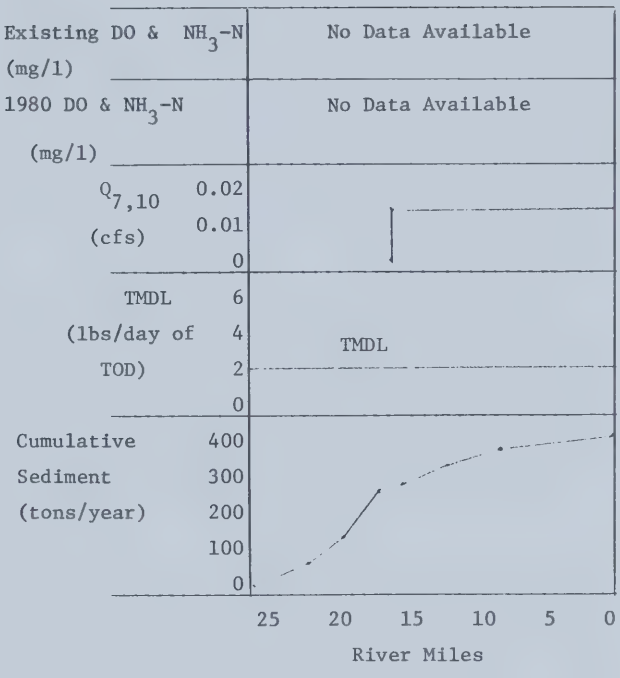
Segment No. 31 Upstream Segments: 00

Downstream Segment: 28

Mainstem: Fox Creek







SEGMENT NO. 32 ANALYSIS

Classification: WQL Priority: 592.4

Description

The location of Segment No. 32 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-32 .1g. The former map shows the relative position of Segment No. 32 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 32 are listed in Exhibit B-32.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 32 (population, housing units, employment, and land use) are presented in Exhibit B- 32.2t and profiles of 1980 data are presented in Exhibit B- 32.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Owingsville - Municipal - RM 11.9
- Pleasant Valley Packing - Industrial - RM 53.8

This Segment encompasses 230 square miles of which 0.9 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-32.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 62.2) increases to .324 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 32.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 32.3t) with which to document the historical record of standards contraventions in Segment 32 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 32 are listed and characterized in Exhibit B- 32.4t. The total waste flows from the point sources is .189 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B-32 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 32 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 32.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (35.2 lb/day of TOD) is compared with the maximum theoretical load of 134 lb/day of TOD. The segment priority assigned to Segment 32 is 592.4.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 32 are presented in Exhibit B- 32.6t.

Segment Strategems

Segment No. 32 (Slate Creek Basin) contains two population centers (Owingsville and Camargo - Jeffersonville), each of which has been designated as 201 Facilities Planning areas. There are a total of seven dischargers located in this Segment, the flows from which provide the entire low flow of the main stem. The ratio of the MTDL to TMDL of 3.5:1 indicates the potential for more efficient use of the assimilative capacity of the Segment, a circumstance requiring in depth evaluation in the 201 Facilities Planning efforts to be conducted.

Exhibit B-32.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 32 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	9597	9901	10253	13047
RURAL	8186	8384	8608	11071
FARM	3725	3806	3900	5247
NON-FARM	4461	4577	4708	6823
URBAN	1411	1517	1645	1775
HOUSING UNITS				
TOTAL	3202	3396	3631	5215
RURAL	2656	2793	2956	4416
URBAN	546	603	674	799
EMPLOYMENT				
TOTAL	1137	1491	1890	3824
MANUFACTURING	326	498	683	1587
NON-MANUFACTURING	811	992	1206	2237
LAND USE				
TOTAL	229	229	229	229
RURAL	227	227	227	227
AGRICULTURE	145	145	145	145
SILVICULTURE	82	82	82	82
MINING	0	0	0	0
URBAN	1	1	1	1

Exhibit B-32.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05138	Owingsville	Dry Br./Slate Cr./ Licking River 511.2/144.4/11.85/1.45	N.I.	Trickling Filter	0	0.16	40	40	20
05139	Camargo School	UT - Brush Cr./Slate Cr./ Licking River 511.2/144.5/45.3/2.3/1.0	N.I.	Extended Aeration	0	0.016	20	25	5
05140	Hope Hill Childrens Home	Salt Well Br./Little Slate Cr./Slate Cr./Licking River 511.2/144.5/41.4/3.7/0.7	N.I.	Extended Aeration	0	0.005	20	25	5
05141	Albert G. Clay Residence	UT - Spencer Cr./Slate Cr. Licking River 511.2/144.5/42.8/6.5/0.8	N.I.	Extended Aeration	0	0.001	20	25	5
05142	First Church of God	UT T - Bowles Br./Brush Cr./ Slate Cr./Licking River 511.2/144.5/45.3/3.36/0.7/ 0.4	N.I.	Extended Aeration	0	0.001	20	25	5
05143	Ridgeway Manor Convalescent Home	UT - Slate Cr./Licking River 511.2/144.4/8.45/0.65	N.I.	Extended Aeration	-----	0.006	20	25	5
05192	Pleasant Valley Packing Co.	UT - Low Spruce Cr./Spruce Cr./Slate Cr./Licking River 511.2/144.5/53.8/1.6/0.75/ 0.25	N.I.	Lagoon (Evapor-ation)	-----	-----	---	---	---

Exhibit B-32.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
05138	Owingsville	15.01 BOD	0.18	10/95%	10/96%	1/96%	8	422.9 Ca
05139	Camargo School	1.50 BOD	0.018	10/95%	10/96%	1/96%	8	--------
05140	Hope Hill Childrens Home	0.42 BOD	0.005	10/95%	10/96%	1/96%	8	--------
05141	Albert G. Clay Residence	0.08 BOD	0.001	10/95%	10/96%	1/96%	8	--------
05142	First Church of God	0.08 BOD	0.001	10/95%	10/96%	1/96%	8	--------
05143	Ridgeway Manor Convalescent Home	0.50 BOD	0.006	10/95%	10/96%	1/96%	8	--------
05192	Pleasant Valley Packing Co.	N.A.	------	------	------	------	------	--------
05---	Montgomery Co. San. Dist. #2	5.42 BOD	0.065	10/95%	10/96%	1/96%	8	1028.3 Ca
	Segment 32	23.01 BOD						592.4

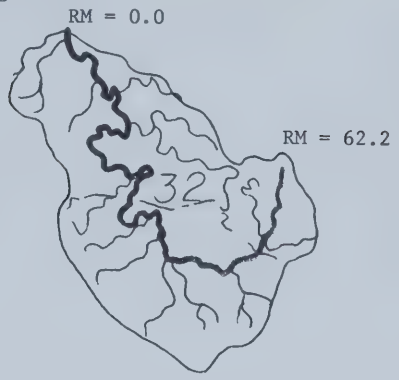
Exhibit B-32.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05138	Owingsville			1977
	Treatment	T4B	335,000	
	Interceptors	N.A.	70,000	
	Collectors	N.A.	117,000	
	Infiltration & Inflow	N.A.	55,000	
05---	Montgomery County San. Dist. #2			1977
	Treatment	T4B	656,000	
	Interceptors	N.A.	181,000	
	Collectors	N.A.	489,000	

Exhibit B-32.1g

Segment No. 32
Upstream Segments: --
Downstream Segment: 28
Mainstem: Slate Creek

Licking River Basin



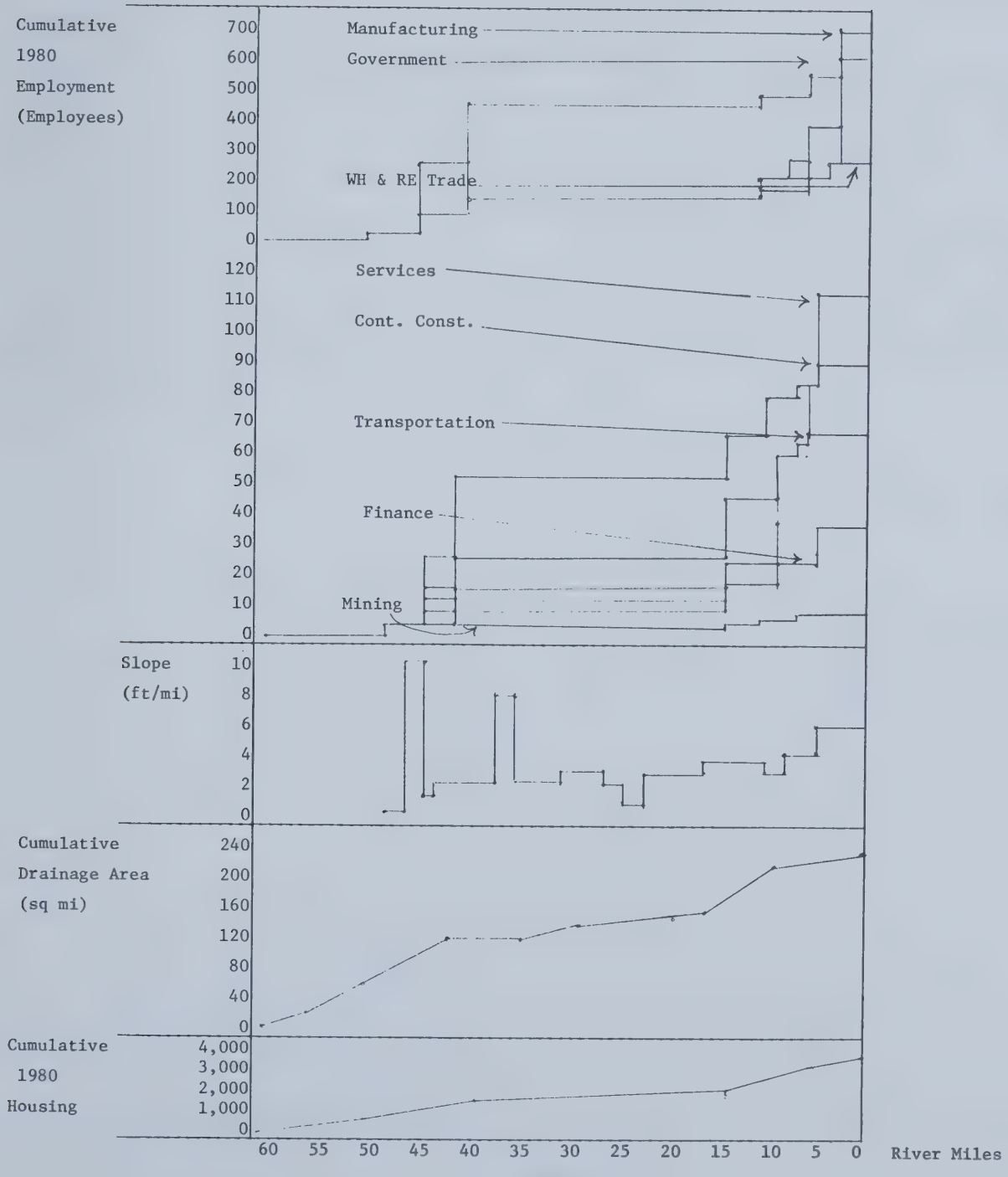
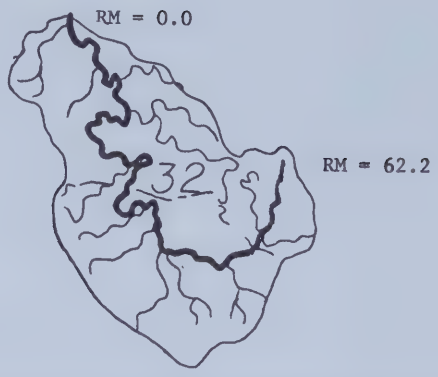
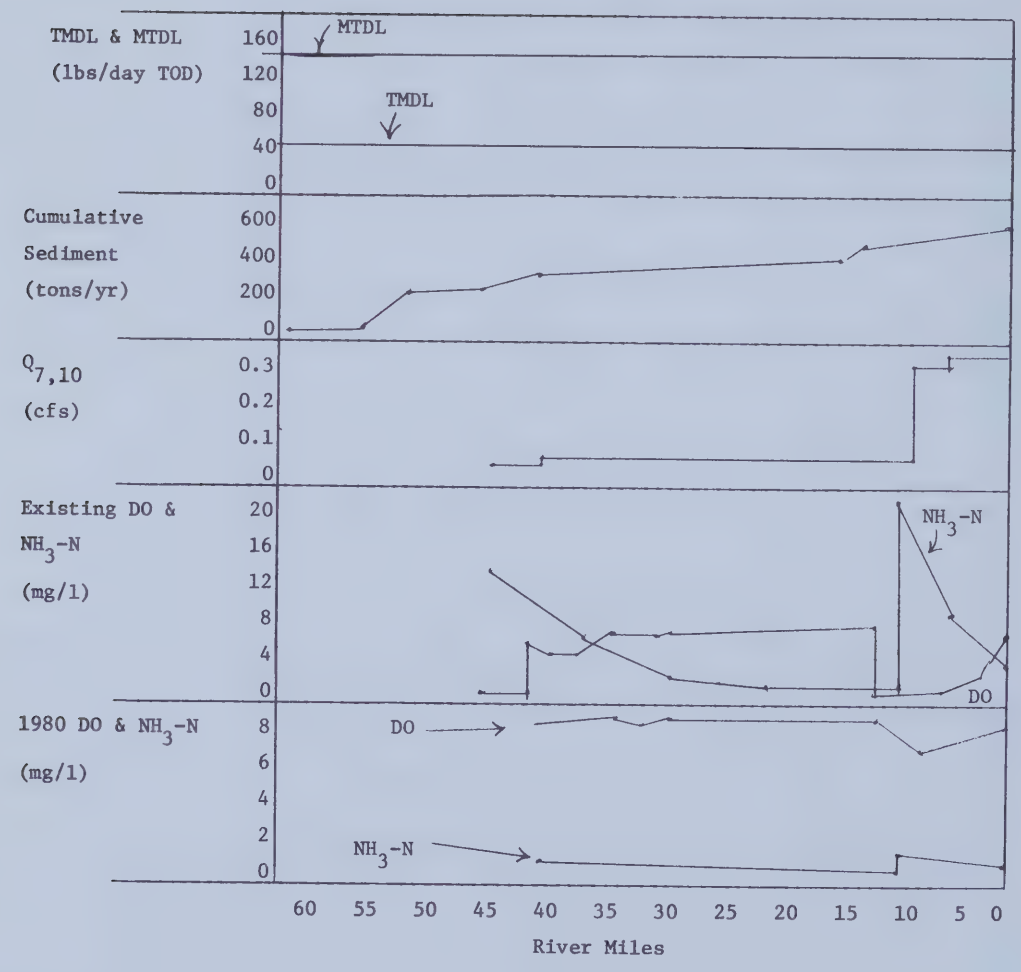


Exhibit B-32.1g Licking River Basin

Segment No. 32 Upstream Segments: --

Downstream Segments: 28 Mainstem: Slate Creek





SEGMENT NO. 33 ANALYSIS

Classification:WQL Priority:105.6

Description

The location of Segment No. 33 is shown in the Segment Map of Exhibit B-0.1m , and Exhibit B-33 .1g. The former map shows the relative position of Segment No. 33 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 33 are listed in Exhibit B-33.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 33 (population, housing units, employment, and land use) are presented in Exhibit B- 33.2t and profiles of 1980 data are presented in Exhibit B-33 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. None

This Segment encompasses 51 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-33.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 17.6) increases to .011cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 33.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 33.3t) with which to document the historical record of standards contraventions in Segment 33.

Point and Nonpoint Source Discharges

The point source discharges in Segment 33 are listed and characterized in Exhibit B- 33.4t. The total waste flows from the point sources is.007 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 33.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 33 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 33.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (1.22 lb/day of TOD) is compared with the maximum theoretical load of 3 lb/day of TOD. The segment priority assigned to Segment 33 is 105.6.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 33 are presented in Exhibit B- 33.6t.

Segment Strategems

Segment No. 33 encompasses the Flat Creek Basin. This rural segment contains only two dischargers which contribute the entire low flow in the stream. The difference between MTDL and TMDL (1.78 lbs/day of TOD) indicates that little assimilative capacity is available in the Segment.

Exhibit B-33.2t

LICKING RIVER BASIN

SEGMENT 33 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1387	1400	1414	1468
RURAL	1387	1400	1414	1468
FARM	717	723	730	756
NON-FARM	670	676	684	712
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	450	467	487	555
RURAL	450	467	487	555
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	50	50	50	50
RURAL	50	50	50	50
AGRICULTURE	46	46	46	46
SILVICULTURE	4	4	4	4
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-33.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05144	Bethel Elementary School	UT - Maux Br./Flat Cr. Licking River 511.2/127/5.8/0.6/1.0	N.I.	Extended Aeration	0	0.0056	20	25	5
05145	Ashland Oil Gas Station	Miners Br./Flat Cr./ Licking River 511.2/127/10.6/4.0	N.I.	Extended Aeration	0	0.001	40	50	13

Exhibit B-33.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05144	Bethel Elementary School	0.53 BOD	0.0063	10/95%	10/96%	1/96%	8	--------
05145	Ashland Oil Gas Station	0.08 BOD	0.001	10/95%	10/96%	1/96%	8	--------
	Segment 33	0.61 BOD						105.6

Exhibit B-33.6t - Municipal Needs - Licking River Basin

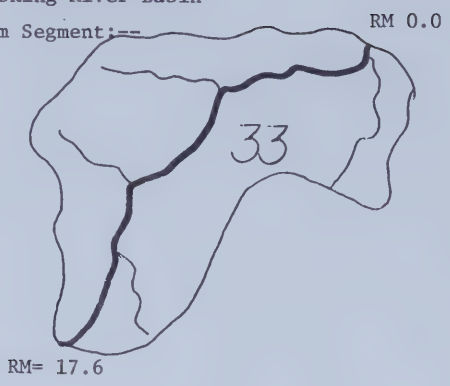
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

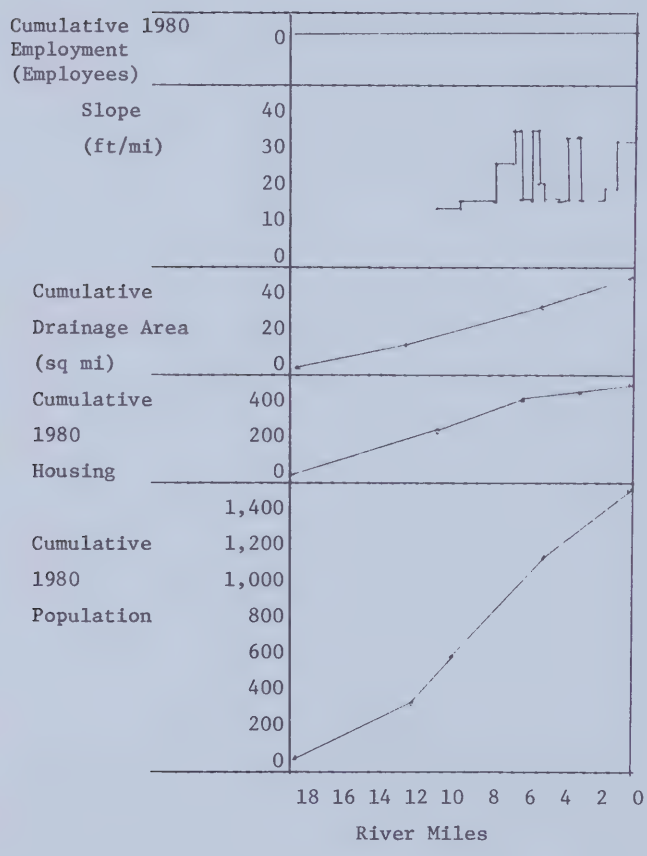
Exhibit B-33.1g Licking River Basin

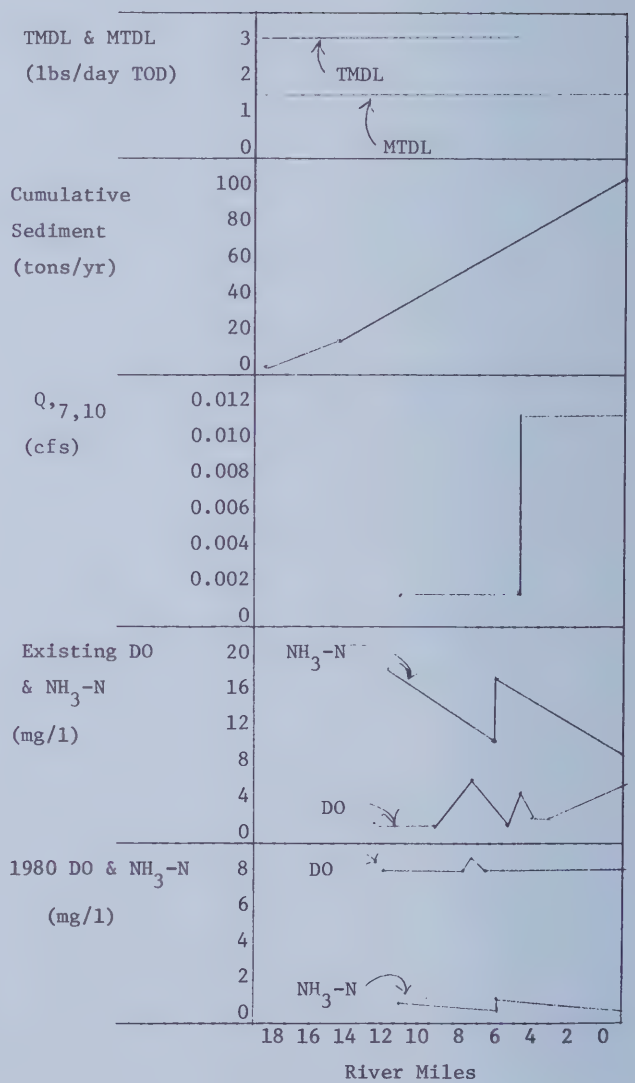
Segment No. 33 Upstream Segment:--

Downstream Segment: 28

Mainstem: Flat Creek







SEGMENT NO. 34 ANALYSIS

Classification: WQL Priority:108.5

Description

The location of Segment No. 34 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-34 .1g. The former map shows the relative position of Segment No. 34 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 34 are listed in Exhibit B-34.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 34 (population, housing units, employment, and land use) are presented in Exhibit B- 34.2t and profiles of 1980 data are presented in Exhibit B- 34.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- None

This Segment encompasses 56 square miles of which 1.7 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-34.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 18.9) increases to .018 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 34.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 34.3t) with which to document the historical record of standards contraventions in Segment 34.

Point and Nonpoint Source Discharges

The point source discharges in Segment 34 are listed and characterized in Exhibit B- 34.4t. The total waste flows from the point sources is .01 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B-34 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 34 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 34.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (1.95 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 34 is 108.5.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 34 are presented in Exhibit B- 34.6t.

Segment Strategems

Segment No. 34 is comprised of the Salt Lick Creek Basin. There are two existing discharges in the Segment, and no excess assimilative capacity is available. The Bath County Water District No. 2, located in the vicinity of Salt Lick has been designated as a 201 Facilities Planning area, and the 201 Study in this Segment should explore the feasibility of a treated effluent discharge at a future date into Segment No. 28 (Licking River) because of the excess assimilative capacity that is available.

Exhibit B-34.2t

LICKING RIVER BASIN

SEGMENT 34 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1565	1650	1729	1930
RURAL	1565	1571	1579	1707
FARM	810	814	818	886
NON-FARM	754	757	761	821
URBAN	20	79	150	222
HOUSING UNITS				
TOTAL	551	591	640	787
RURAL	544	562	584	696
URBAN	7	28	55	90
EMPLOYMENT				
TOTAL	178	282	409	537
MANUFACTURING	2	50	107	156
NON-MANUFACTURING	176	232	302	381
LAND USE				
TOTAL	56	56	56	56
RURAL	55	55	55	55
AGRICULTURE	13	13	13	13
SILVICULTURE	41	41	41	41
MINING	0	0	0	0
URBAN	1	1	1	1

Exhibit B-34.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05128	Highley Laundry	Salt Lick Cr./Licking River 511.2/65.5/1.1	0001066	Lagoon	0	0.0064	25	30	6
05146	Salt Lick Elementary School	Campbell Hollow/Salt Lick Cr./Licking River 511.2/165.5/1.75/0.3	N.I.	Extended Aeration	0	0.0040	20	25	5

Exhibit B-34.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
NO DISCHARGERS IN THIS SEGMENT.								

Exhibit B-34.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

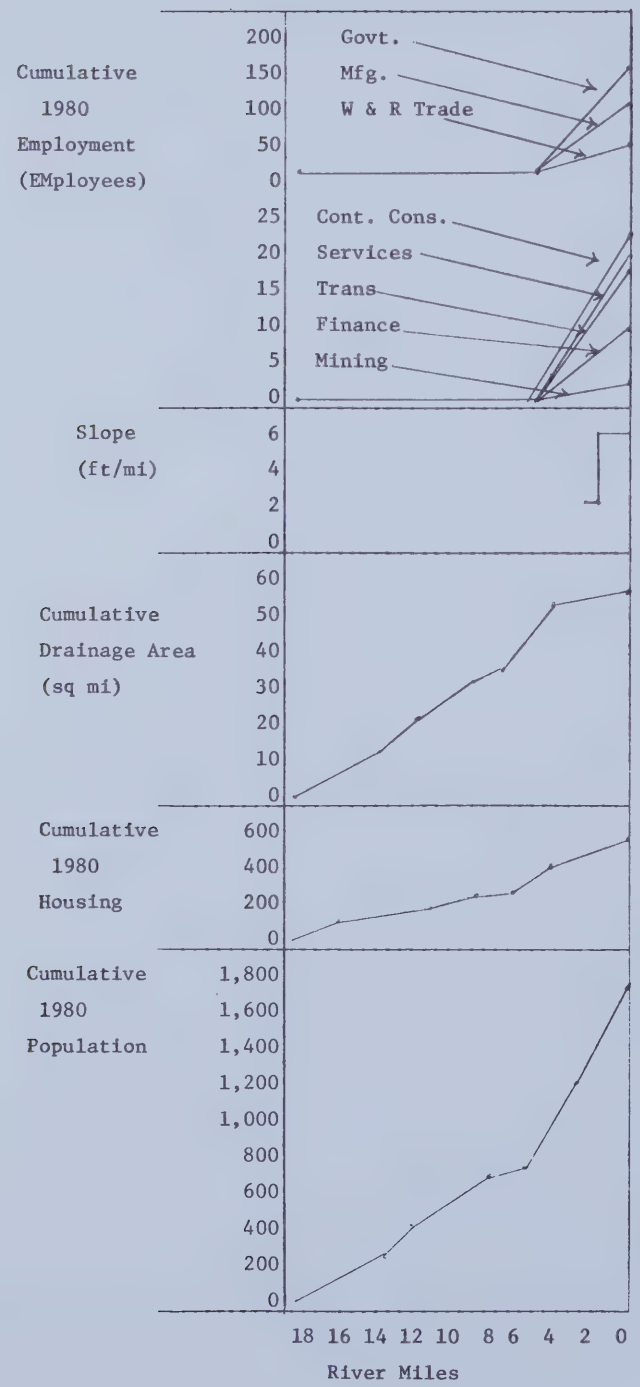
Exhibit B-34.1g Licking River Basin

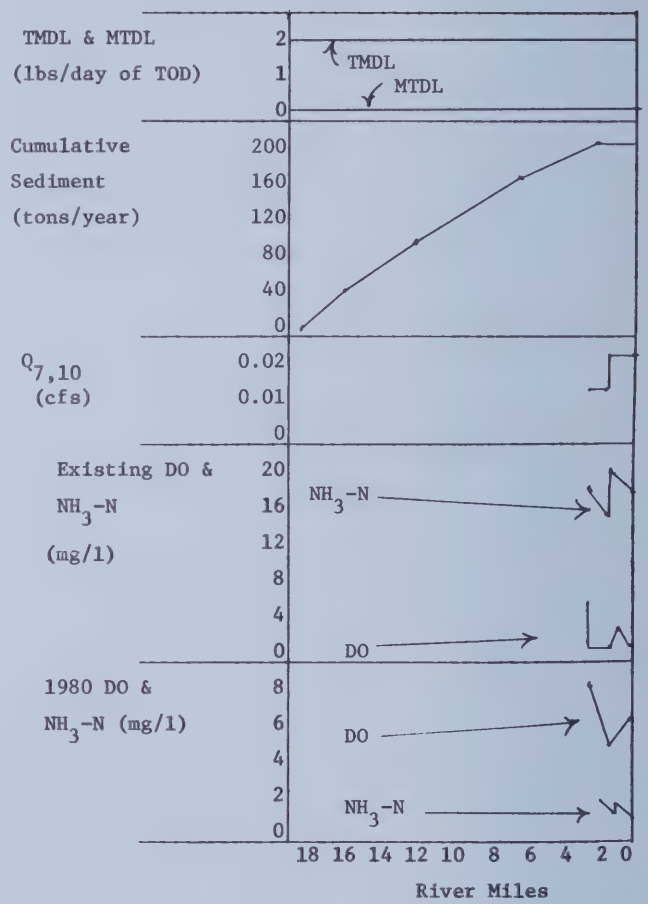
Segment No. 34

Upstream Segments: --

Downstream Segment: 28

Mainstem: Salt Lick





SEGMENT NO. 35 ANALYSIS

Classification: WQL Priority: 719.2

Description

The location of Segment No.35 is shown in the Segment Map of Exhibit B-0.5m , and Exhibit B-35 .1g. The former map shows the relative position of Segment No. 35 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 35 are listed in Exhibit B-35.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 35 (population, housing units, employment, and land use) are presented in Exhibit B- 35.2t and profiles of 1980 data are presented in Exhibit B- 35.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

- Morehead - Municipal - RM 12.1
- East Kentucky Paving Co. - Industrial - RM 12.3
- Tennessee Gas Transmission - Industrial - RM 5.8

This Segment encompasses 186 square miles of which 3.2 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-35.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 22.8) increases to 1.4 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 35.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 35.3t) with which to document the historical record of standards contraventions in Segment 35 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 35 are listed and characterized in Exhibit B- 35.4t. The total waste flows from the point sources is .9 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 35.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 35 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 35.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (192 lb/day of TOD) is compared with the maximum theoretical load of 427 lb/day of TOD. The segment priority assigned to Segment 35 is 719.2.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 35 are presented in Exhibit B- 35.6t.

Segment Strategems

Segment No. 35, the Triplett Creek Basin, empties into the Licking River below Cave Run Reservoir. Development in the segment is centered around Morehead on the main stem of the Segment. There are 17 discharges located in the Segment, the majority of which are located in the 201 Facilities Planning areas for Morehead. The excess assimilative capacity in Segment No. 35 amounts to 235 lbs/day of TOD, and important priorities of the Morehead 201 Facilities Planning program will be the examination of the feasibility of regionalization and how the excess assimilative capacity of the Segment can best be utilized.

Exhibit B-35.2t

LICKING RIVER BASIN

SEGMENT 35 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	14181	15541	16956	21283
RURAL	6720	6674	6979	10288
FARM	2170	2220	2254	3323
NON-FARM	4549	4454	4724	6965
URBAN	7461	8867	9977	10994
HOUSING UNITS				
TOTAL	3532	3847	4150	5196
RURAL	2257	2207	2253	3146
URBAN	1275	1640	1897	2047
EMPLOYMENT				
TOTAL	4116	5862	8024	11015
MANUFACTURING	723	1564	2545	3626
NON-MANUFACTURING	3394	4317	5478	7389
LAND USE				
TOTAL	186	186	186	186
RURAL	180	179	179	179
AGRICULTURE	45	45	45	45
SILVICULTURE	133	133	133	133
MINING	0	0	0	0
URBAN	6	6	6	6

Exhibit B-35.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l) Flow (mgd)	BOD	SS	NH_3
05147	Morehead	Triplett Cr./Licking River 511.2/168.5/12.1	0020729	Trickling Filter	.035	0.72	40	40	20
05148	Park Hills Subdivision	UT - Little Brushy Cr./Big Brushy Cr./No. Fk. Triplett/ Triplett Cr./Licking River 511.2/168.5/5.8/7.95/1.7/ 1/0.15	N.I.	Extended Aeration	0	0.016	40	40	10
05149	Morehead State University Farm	Big Brushy Cr./No. Fk. Triplett Cr./Triplett Cr./ Licking River 511.2/168.5/5.8/7.95/1.1	0002933	Lagoon	.028	0.016	50	50	10
05150	Haldeman Elementary School	Bearskin Br./Triplett Cr. Licking River 511.2/168.5/21.7/0.15	N.I.	Extended Aeration	0	0.0040	20	25	5
05151	Clearfield Elementary School	Mill Br./Triplett Cr./ Licking River 511.2/168.5/12.0/0.36	N.I.	Extended Aeration	0	0.004	20	25	5
05152	Farmers Elementary School	UT - Triplett Cr./Licking River 511.2/168.5/3.3/0.38	N.I.	Extended Aeration	0	0.004	20	25	5
05153	Morehead Treatment Center	Pence Br./No. Fk. Triplett/ Triplett Cr./Licking River 511.2/168.5/5.8/5.6/0.8	N.I.	Septic Tank & Sand Filter	0	0.0036	50	20	25
05154	Holiday Inn	Pence Br./No. Fk. Triplett/ Triplett Cr./Licking River/ 511.2/168.5/5.8/5.6/0.66	N.I.	Extended Aeration	.009	0.016	40	40	10
05155	Shell Oil Service Station	Pence Br./No. Fk. Triplett/ Triplett Cr./Licking River 511.2/168.5/5.8/5.6/0.75	N.I.	Extended Aeration	.006	0.001	25	30	6
05156	Standard Oil Service Station	Pence Br./No. Fk. Triplett/ Triplett Cr./Licking River 511.2/168.5/5.8/5.6/0.73	N.I.	Extended Aeration	.008	0.001	40	40	10
05157	Lakeview Hgts. #1 & #2	Triplett Cr./Licking River 511.2/168.5/7.3	N.I.	Extended Aeration	1.295	0.032	40	40	10
05158	Tilden Hogge School	No. Fk. Triplett/Triplett Cr./Licking River 511.2/168.5/5.8/13.8	N.I.	Extended Aeration	.054	0.004	40	40	10
05159	Daniel Boone Motel	UT - Triplett Cr./Licking River 511.2/168.5/15.3/0.3	N.I.	Extended Aeration	0	0.004	40	40	10
05161	Lexington Concrete Products	Triplett Cr./Licking River 511.2/168.5/13.6	N.I.	N.A.	-----	------	---	---	---
05162	Big Sandy Ready Mix	Triplett Cr./Licking River 511.2/168.5/14.1	N.I.	N.A.	-----	------	---	---	---
05160	East KY Paving	Morgan Fk./Dry Cr./ Triplett Cr./Licking River 511.2/168.5/12.3/0.5/2.2	N.I.	Lagoon	0	01016	120	102	24
05193	Tennessee Gas Transmission	No. Fk. Triplett Cr./ Triplett Cr./Licking River 511.2/168.5/5.8/15.7	0001490	N.A.	0	0.035	---	---	---

Exhibit B-35.5t - Waste Load Allocations (1980) - Licking River Basin

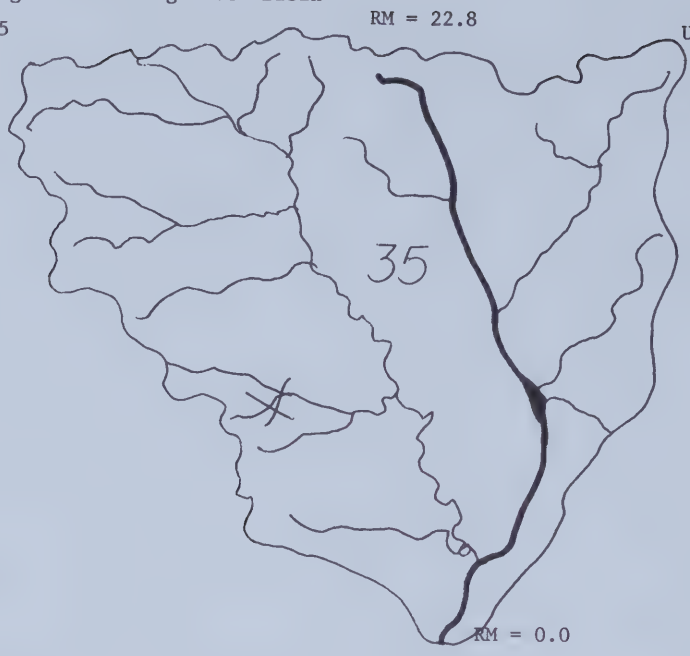
Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05147	Morehead	67.55 BOD	0.81	10/95%	10/96%	1/96%	8	1504.6 Ca
05148	Park Hills Subdivision	1.50 BOD	0.018	10/95%	10/96%	1/96%	8	--------
05149	Morehead State University Farm	0.45 BOD	0.0018	30/85%	30/88%	20/20%	4	--------
05150	Haldeman Elementary School	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05151	Clearfield Elementary School	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05152	Farmers Elementary School	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05153	Morehead Treatment Center	0.34 BOD	0.0041	10/95%	10/96%	1/96%	8	--------
05154	Holiday Inn	1.50 BOD	0.018	10/95%	10/96%	1/96%	4	--------
05155	Shell Oil Service Station	0.17 BOD	0.001	20/90%	20/92%	15/40%	4	--------
05156	Standard Oil Service Station	0.08 BOD	0.001	10/95%	10/96%	1/96%	4	--------
05157	Lakeview Hgts. #1 & #2	9.01 BOD	0.036	30/85%	30/88%	20/20%	4	--------
05158	Tilden Hogge School	0.38 BOD	0.0045	10/95%	10/96%	1/96%	4	--------
05159	Daniel Boone Motel	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05161	Lexington Concrete Products	N.A.	0.0045	10/95%	10/96%	1/96%	8	--------
05162	Big Sandy Ready Mix	N.A.	------	------	------	------	------	--------
05160	East KY Paving	1.50 BOD	0.018	10/95%	10/96%	1/96%	8	--------
05193	Tennessee Gas Transmission	N.A.	------	------	------	------	------	--------
	Segment 35	84.00 BOD						719.2

Exhibit B-35.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05147	Morehead			1977
	Treatment	T4B	1,444,000	
	Interceptors	N.A.	639,000	
	Collectors	N.A.	1,892,000	
	Infiltration & Inflow	N.A.	77,000	

Exhibit B-35.1g Licking River Basin

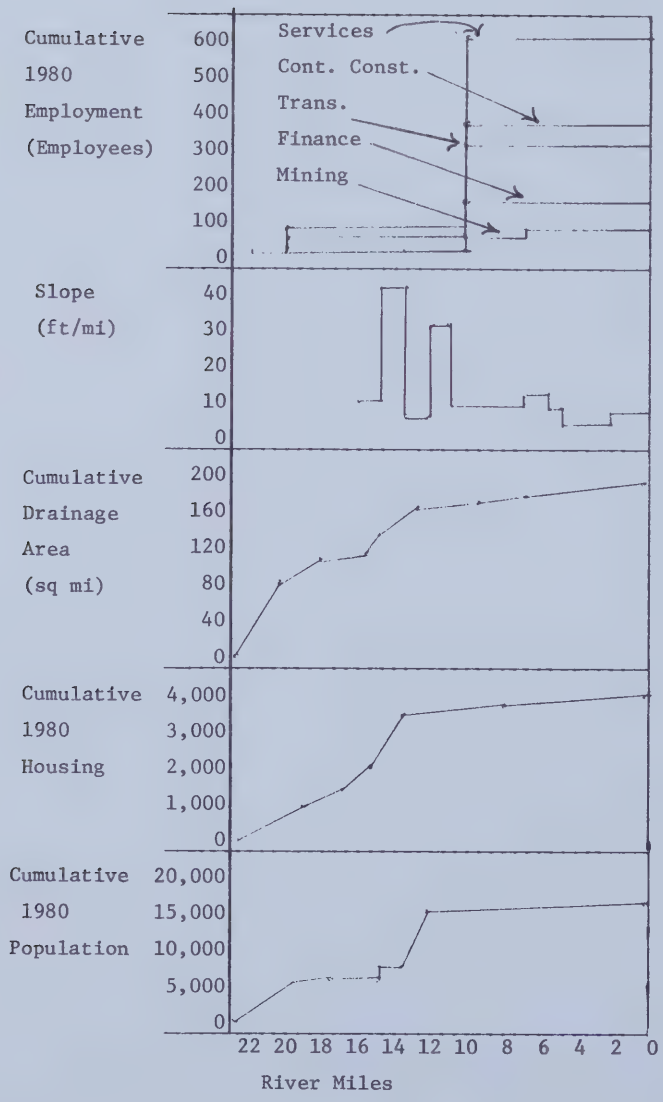
Segment No. 35



Upstream Segments: --

Downstream Segment: 28

Mainstem: Triplett Creek



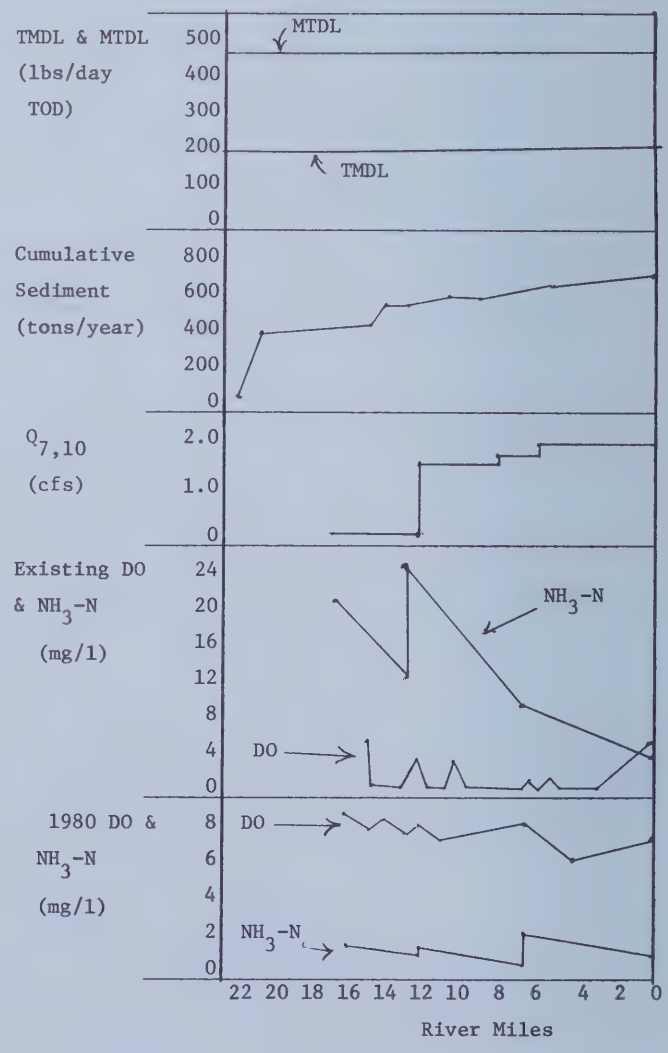
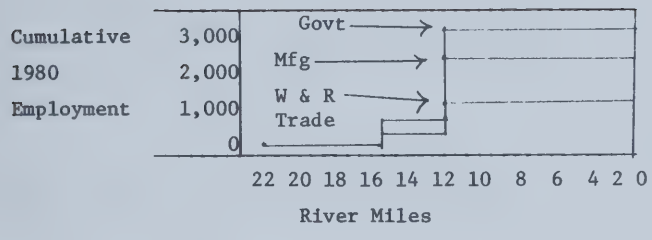


Exhibit B-35.1g Licking River Basin

Segment No. 35 Upstream Segments: --

Downstream Segment: 28 Mainstem Tripplett Creek



SEGMENT NO. 36 ANALYSIS

Classification: WQL Priority: 215.8

Description

The location of Segment No. 36 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-36 .1g. The former map shows the relative position of Segment No. 36 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 36 are listed in Exhibit B-36.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 36 (population, housing units, employment, and land use) are presented in Exhibit B- 36.2t and profiles of 1980 data are presented in Exhibit B-36 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. West Liberty - Municipal - RM 226

This Segment encompasses 454 square miles of which .7 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-36.1g. The 7 day Q_{10} flow of .138 cfs at the upstream of the segment (RM 256) increases to 54.4 cfs at the downstream (RM 168.5). The total flow augmentation within the Segment is 50 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 36.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 36.3t) with which to document the historical record of standards contraventions in Segment 36 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 36 are listed and characterized in Exhibit B- 36.4t. The total waste flows from the point sources is .13 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 36.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 36 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 36.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (27 lb/day of TOD) is compared with the maximum theoretical load of 4748 lb/day of TOD. The segment priority assigned to Segment 36 is 215.8.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 36 are presented in Exhibit B- 36.6t.

Segment Strategems

Segment No. 36 consists of the draiange area tributary to an 87.5 mile reach of the main stem of the Licking River. The recently completed Cave Run Reservoir is located in this Segment, and the major urbanized center is the City of West Liberty. The hydrology of the segment is greatly altered by Cave Run Reservoir; the natural low flow above the Reservoir is less than one cfs as compared to the low flow augmentation of 50 cfs provided by the Reservoir. As a result, the segment possesses a large amount of unused assimilative capacity in the reach below the dam. Intermittent water treatment problems are reported at water intakes located below the dam, indicating the need for operational coordination.

Exhibit B-36.2t

LICKING RIVER BASIN

SEGMENT 36 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	12435	12555	12714	13130
RURAL	11048	11248	11452	11967
FARM	4967	5033	5104	5291
NON-FARM	6080	6215	6347	6695
URBAN	1387	1307	1262	1142
HOUSING UNITS				
TOTAL	4056	4231	4451	5210
RURAL	3553	3733	3944	4674
URBAN	505	498	505	537
EMPLOYMENT				
TOTAL	1457	1740	2027	2370
MANUFACTURING	297	435	566	886
NON-MANUFACTURING	1160	1306	1461	1884
LAND USE				
TOTAL	453	453	453	453
RURAL	452	450	450	450
AGRICULTURE	106	105	105	105
SILVICULTURE	333	332	332	332
MINING	0	0	0	0
URBAN	0	2	2	2

Exhibit B-36.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05163	West Liberty	Licking River 511.2/225.7	0023175	Trickling Filter	.145	0.10	40	40	20
05164	Woods Bend Boys Center	Spring Br./Licking River 511.2/216.3/0.4	N.I.	Extended Aeration	0	0.004	40	40	10
05165	Neal Valley Apartments	UT - Licking River 511.2/223.6/0.6	N.I.	Extended Aeration	0	0.004	40	40	10
05166	Cave Run Reservoir	UT - Licking 511.2/176.55/1.0	N.I.	Tertiary	0	0.0056	10	10	2
05173	New Morgan County High School	Caney Cr./Licking River 511.2/220.3/4.8	N.I.	Extended Aeration	0	0.013	40	40	10

Exhibit B-36.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05163	West Liberty	10.84 BOD	0.13	10/95%	10/96%	1/96%	4	30.8 Ca
05164	Woods Bend Boys Center	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05165	Neal Valley Apartments	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05166	Cave Run Reservoir	0.53 BOD	0.0063	10/95%	10/96%	1/96%	8	--------
05173	New Morgan County High School	1.25 BOD	0.015	10/95%	10/96%	1/96%	8	--------
05179	Millard Hensley Elementary School	N.A.	------	------	------	------	------	--------
	Segment 36	13.38 BOD						215.8

Exhibit B-36.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05163	West Liberty			1977
	Treatment	T4A	327,000	
	Collectors	N.A.	194,000	
	Infiltration & Inflow	N.A.	237,000	

Exhibit B-36.1g Licking River Basin

Segment No. 36 Upstream Segments: 40

Dowmstream Segment: 28

Mainstem: Licking River

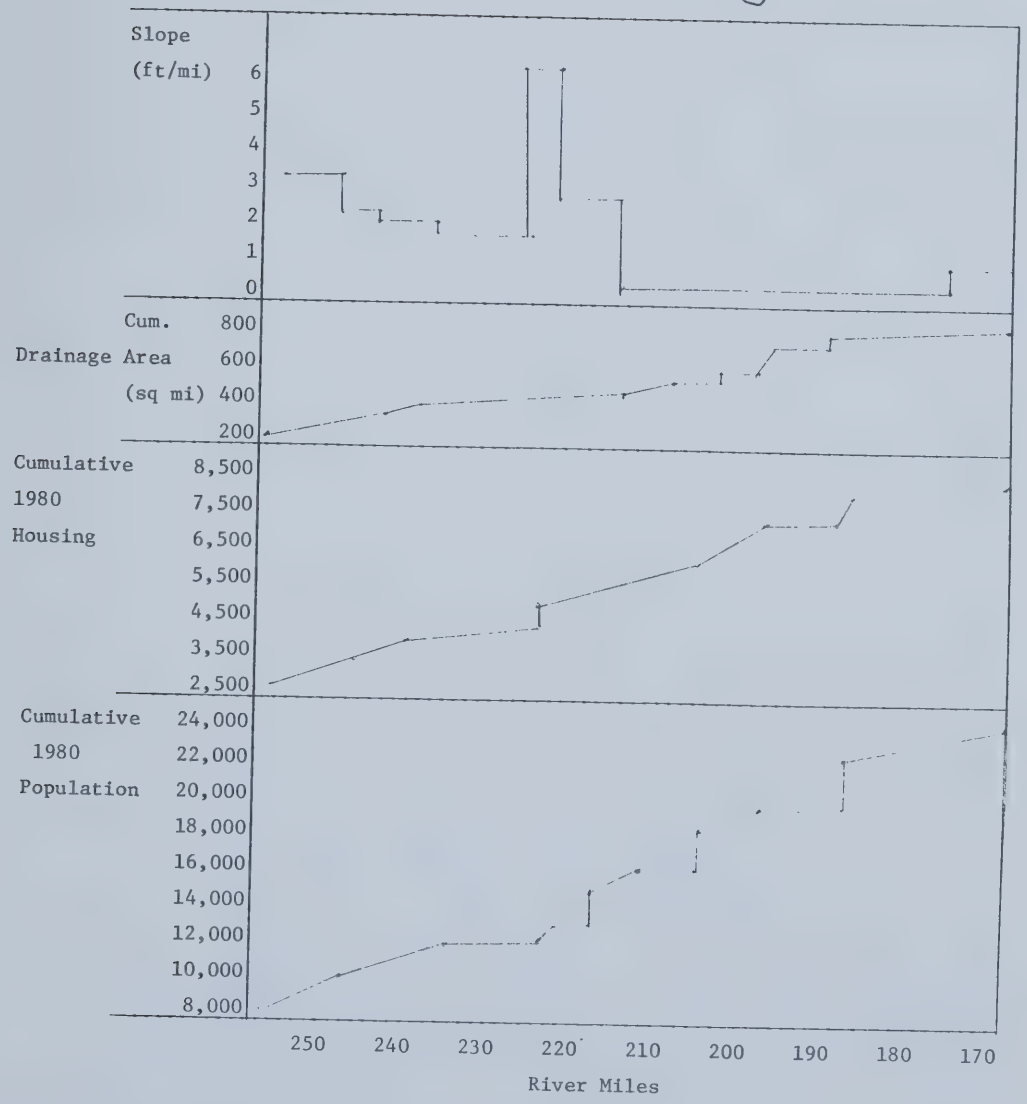


Exhibit B-36.1g Licking River Basin
Segment No. 36 Upstream Segments: 40
Downstream Segment: 28 Mainstem: Licking River

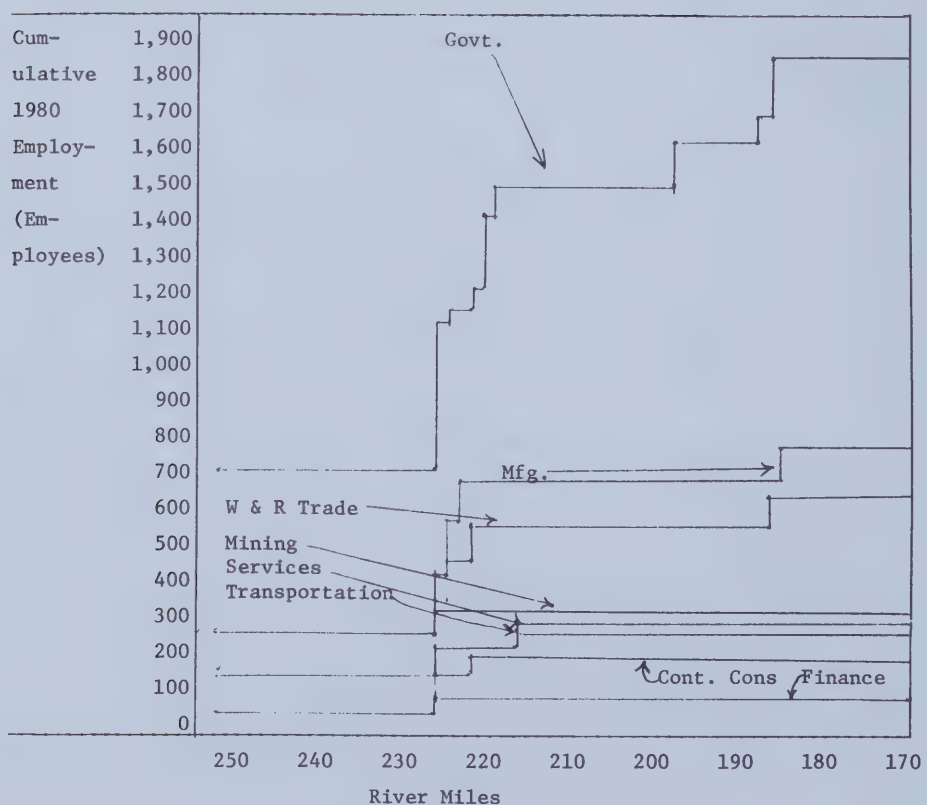
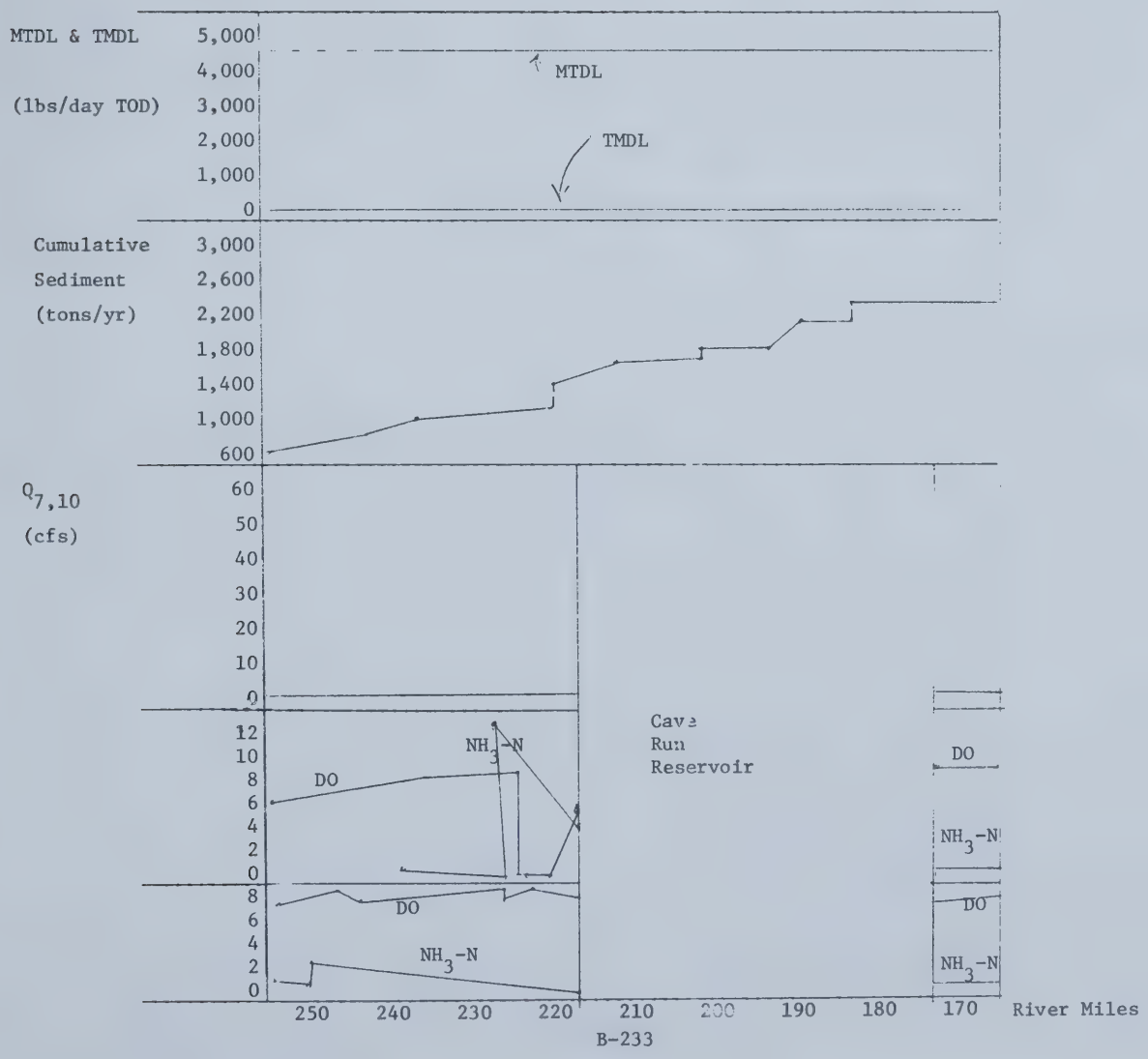


Exhibit B-36.1g Licking River Basin

Segment No. 36 Upstream Segments: 40

Downstream Segment: 28 Mainstem: Licking River



SEGMENT NO. 37 ANALYSIS

Classification: WQL Priority: 136.7

Description

The location of Segment No. 37 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-37 .1g. The former map shows the relative position of Segment No. 37 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 37 are listed in Exhibit B-37.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 37 (population, housing units, employment, and land use) are presented in Exhibit B- 37.2t and profiles of 1980 data are presented in Exhibit B-37 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. Frenchburg - Municipal - RM 14.5

This Segment encompasses 53 square miles of which 1.9 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-37.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 19.2) increases to .092 cfs at the downstream (RM 6.4). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 37.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/1 DO and $\leq$ 4.0 mg/1 NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 37.3t) with which to document the historical record of standards contraventions in Segment 37.

Point and Nonpoint Source Discharges

The point source discharges in Segment 37 are listed and characterized in Exhibit B-37 .4t. The total waste flows from the point sources is .056 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 37.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 37 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 37.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (12 lb/day of TOD) is compared with the maximum theoretical load of 31 lb/day of TOD. The segment priority assigned to Segment 37 is 136.7.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 37 are presented in Exhibit B- 37.6t.

Segment Strategems

Segment No. 37 is comprised of the Beaver Creek. Frenchburg, located near the headwaters of Beaver Creek, is the major urbanized area and point source discharge in the Segment. There are four other point source discharges in the Segment and the entire low flow hydrology of the Segment is derived from wastewater discharges. The excess assimilative capacity in the Segment (19.4 lbs/day of TOD) occurs primarily in the lower reaches of the Segment.

Exhibit B-37.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 37 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1450	1468	1480	1530
RURAL	970	971	972	1010
FARM	447	447	448	465
NON-FARM	523	523	523	544
URBAN	480	497	508	519
HOUSING UNITS				
TOTAL	490	512	537	626
RURAL	317	328	341	401
URBAN	172	184	195	225
EMPLOYMENT				
TOTAL	322	424	535	652
MANUFACTURING	28	77	128	171
NON-MANUFACTURING	294	347	406	481
LAND USE				
TOTAL	53	53	53	53
RURAL	52	52	52	52
AGRICULTURE	8	8	8	8
SILVICULTURE	43	43	43	43
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-37.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
05167	Botts Elementary School	Botts Fk./Brushy Fk./Beaver Cr./Licking River 511.2/188/6.43/3.8/3.7	N.I.	Extended Aeration	0	0.0017	40	40	10
05168	Menifee Elementary & High Schools	Beaver Cr./Licking River 511.2/188/17.23	N.I.	Extended Aeration	.003	0.0048	40	40	10
05169	Frenchburg KOA Camp Site	UT - Beaver Cr./Licking River 511.2/188/17.56/0.5	N.I.	Extended Aeration	0	0.0020	40	40	10
05170	Community Canning Co.	Beaver Cr./Licking River 511.2/188/15.2	N.I.	Lagoon	.012	0.002	120	105	24
05171	Frenchburg Municipal STP	Beaver Cr./Licking River 511.2/188/14.5	N.I.	Extended Aeration	.015	0.045	25	30	6

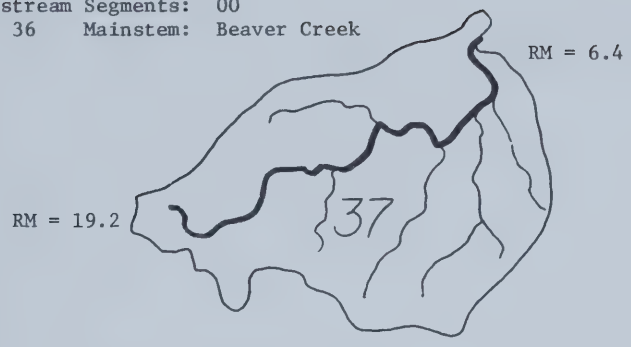
Exhibit B-37.5t - Waste Load Allocations (1980) - Licking River Basin

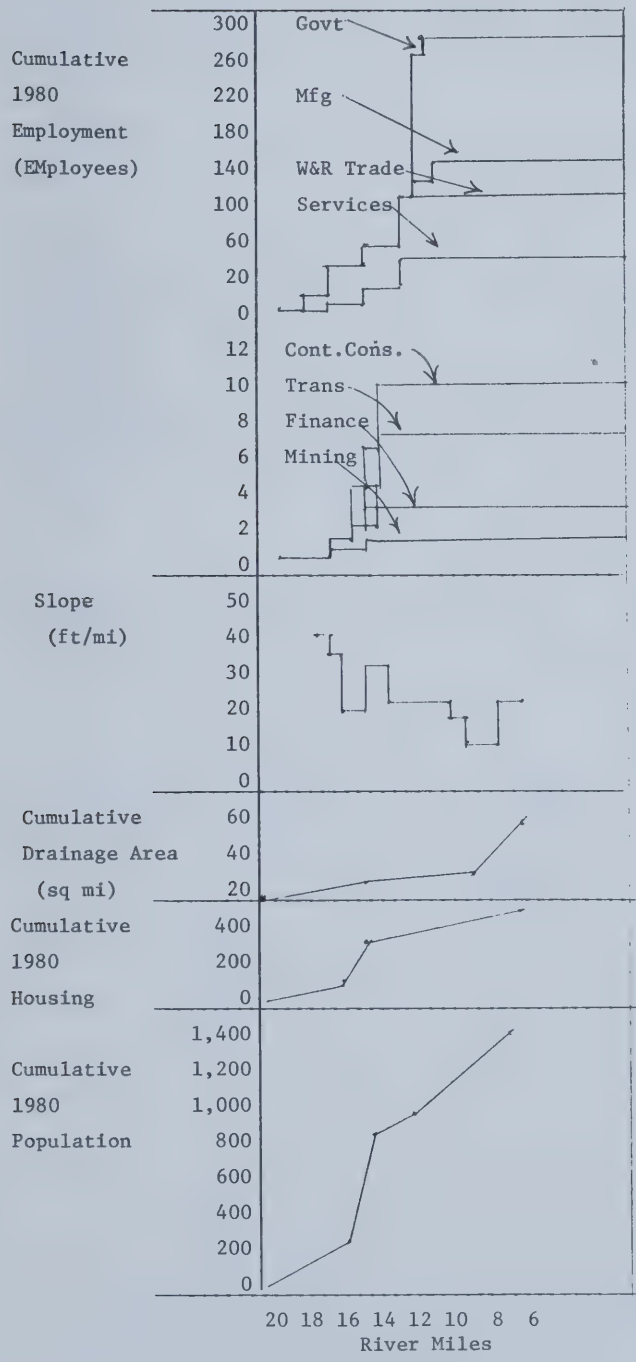
Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05167	Botts Elementary School	0.16 BOD	0.0019	10/95%	10/96%	1/96%	8	--------
05168	Menifee Elementary & High Schools	0.45 BOD	0.0054	10/95%	10/96%	1/96%	8	--------
05169	Frenchburg KOA Camp Site	0.18 BOD	0.0022	10/95%	10/96%	1/96%	8	--------
05170	Community Canning Co.	0.33 BOD	0.002	20/90%	20/92%	15/40%	4	--------
05171	Frenchburg Municipal	4.17 BOD	0.050	10/95%	10/96%	1/96%	8	165.2 Ca
	Segment 37	5.29 BOD						136.7

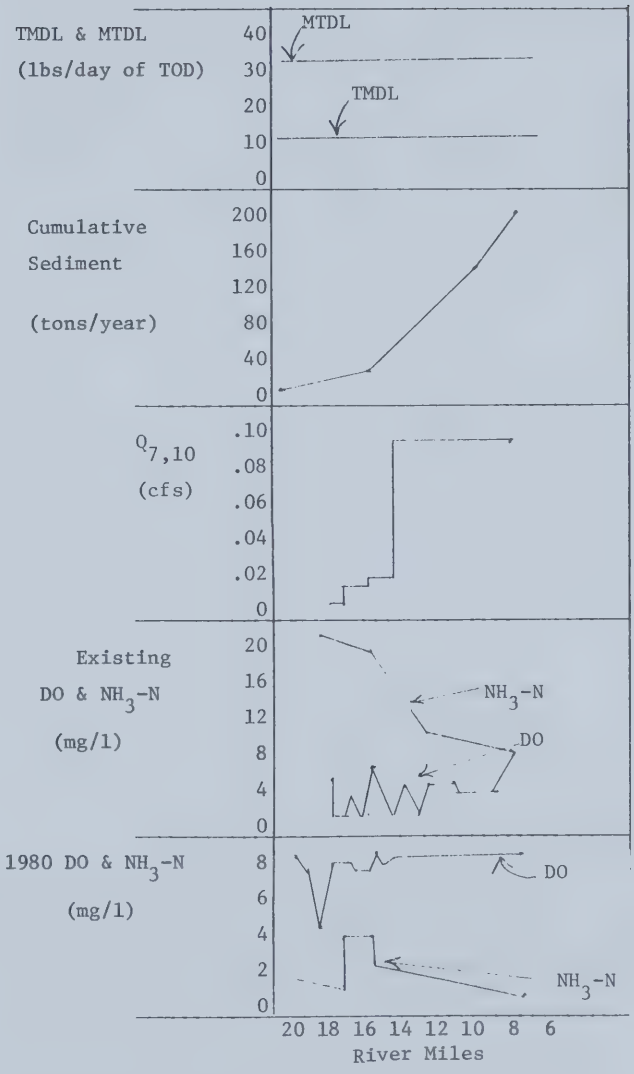
Exhibit B-37.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
05171	Frenchburg Treatment	T4B	222,000	1977

Exhibit B-37.1g Licking River Basin
Segment No. 37 Upstream Segments: 00
Downstream Segment: 36 Mainstem: Beaver Creek







SEGMENT NO. 38 ANALYSIS

Classification: EL Priority:102.6

Description

The location of Segment No. 38 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-38 .1g. The former map shows the relative position of Segment No. 38 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 38 is listed in Exhibit B-38.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 38 (population, housing units, employment, and land use) are presented in Exhibit B- 38.2t and profiles of 1980 data are presented in Exhibit B- 38.1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

None

This Segment encompasses 44 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-38.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 14.9) increases to .004 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 38.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 38.3t) with which to document the historical record of standards contraventions in Segment 38.

Point and Nonpoint Source Discharges

The point source discharge in Segment 38 is listed and characterized in Exhibit B- 38.4t. The total waste flows from the point source is .002 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B-38 .1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 38 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 38.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (.45 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 38 is 102.6.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 38 are presented in Exhibit B- 38.6t.

Segment Strategems

Segment No. 38, the Blackwater Creek Basin, contains only one small discharger on a tributary to the mainstem. Because of the resuling low flow of 0.004 cfs there is little available assimilative capacity within the segment.

Exhibit B-38.2t

LICKING RIVER BASIN

SEGMENT 38 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1029	1023	1020	1006
RURAL	1029	1023	1020	1006
FARM	507	504	502	495
NON-FARM	521	519	517	510
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	345	358	375	429
RURAL	345	358	375	429
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	44	44	44	44
RURAL	44	44	44	44
AGRICULTURE	21	21	21	21
SILVICULTURE	22	22	22	22
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-38.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05172	Roadside Park at Broken Leg Falls	Broken Leg Cr./Licking River 511.2/206.5/8.3/3.8	N.I.	Extended Aeration	0	0.0024	40	40	10

Exhibit B-38.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/l)	SS (mg/l)	NH_3 (mg/l)	DO (mg/l)	
05172	Roadside Park at Broken Leg Falls	0.23 BOD	0.0027	10/95%	10/96%	1/96%	8	--------
	Segment 38	0.23 BOD						102.6

Exhibit B-38.6t - Municipal Needs - Licking River Basin

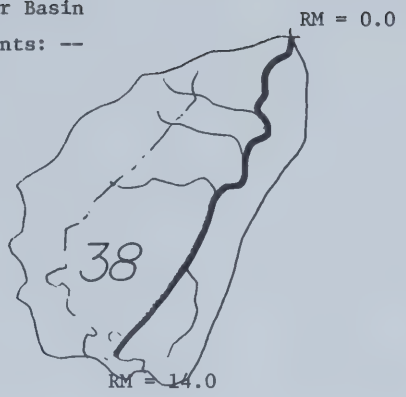
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

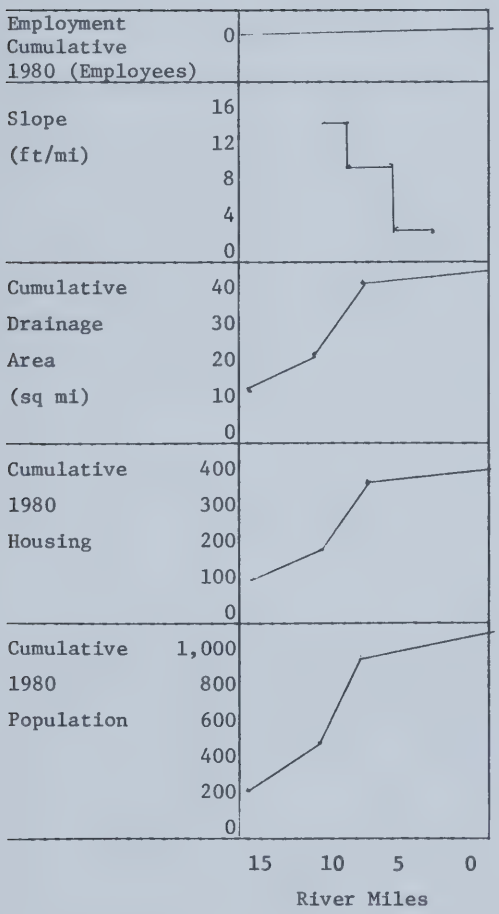
Exhibit B-38.1g Licking River Basin

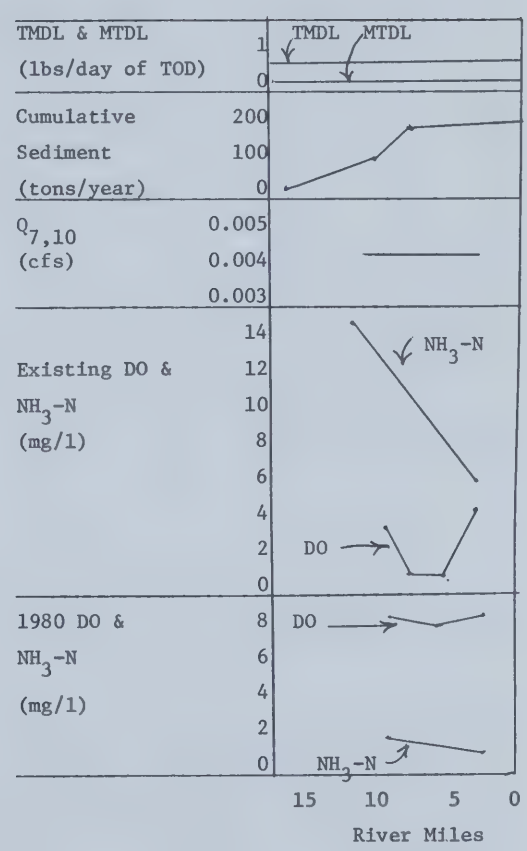
Segment No. 38 Upstream Segments: --

Downstream Segment: 36

Mainstem: Blackwater Creek







SEGMENT NO. 39 ANALYSIS

Classification: EL Priority: 101.6

Description

The location of Segment No. 39 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-39 .1g. The former map shows the relative position of Segment No. 39 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharge to Segment No. 39 is listed in Exhibit B-39.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 39 (population, housing units, employment, and land use) are presented in Exhibit B- 39.2t and profiles of 1980 data are presented in Exhibit B-39 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

. None

This Segment encompasses 77 square miles of which 0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-39.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 19.4) increases to 0 cfs at the downstream (RM 0). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 39.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 39.3t) with which to document the historical record of standards contraventions in Segment 39 .

Point and Nonpoint Source Discharges

The point source discharge in Segment 39 is listed and characterized in Exhibit B- 39.4t. The total waste flows from the point source is 0 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 39.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 39 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 39.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (0 lb/day of TOD) is compared with the maximum theoretical load of 0 lb/day of TOD. The segment priority assigned to Segment 39 is 101.6.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 39 are presented in Exhibit B- 39.6t.

Segment Strategems

There are no dischargers and no natural Q_{7-10} in Segment No. 39, which is comprised of the Elk Fork. As a result there exists no assimilative capacity in the Segment.

Exhibit B-39.2t

LICKING RIVER BASIN

SEGMENT 39 BASIC PLANNING DATA

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	1605	1590	1561	1542
RURAL	1605	1590	1581	1542
FARM	831	823	819	798
NON-FARM	773	766	762	743
URBAN	0	0	0	0
HOUSING UNITS				
TOTAL	498	517	542	618
RURAL	498	517	542	618
URBAN	0	0	0	0
EMPLOYMENT				
TOTAL	0	0	0	0
MANUFACTURING	0	0	0	0
NON-MANUFACTURING	0	0	0	0
LAND USE				
TOTAL	76	76	76	76
RURAL	76	76	76	76
AGRICULTURE	14	14	14	14
SILVICULTURE	61	61	61	61
MINING	0	0	0	0
URBAN	0	0	0	0

Exhibit B-39.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/l)			
						Flow (mgd)	BOD	SS	NH_3
NO DISCHARGES IN THIS SEGMENT.									

Exhibit B-39.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH3 (mg/1)	DO (mg/1)	
NO DISCHARGERS IN THIS SEGMENT.								

Exhibit B-39.6t - Municipal Needs - Licking River Basin

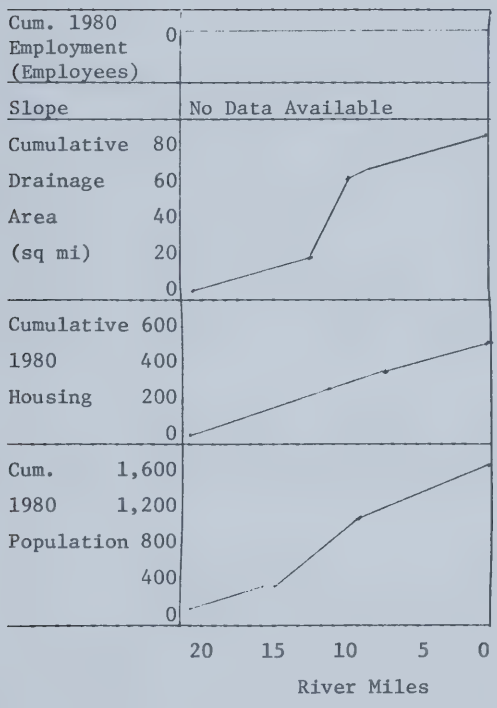
Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
NO MUNICIPAL NEEDS IN THIS SEGMENT.				

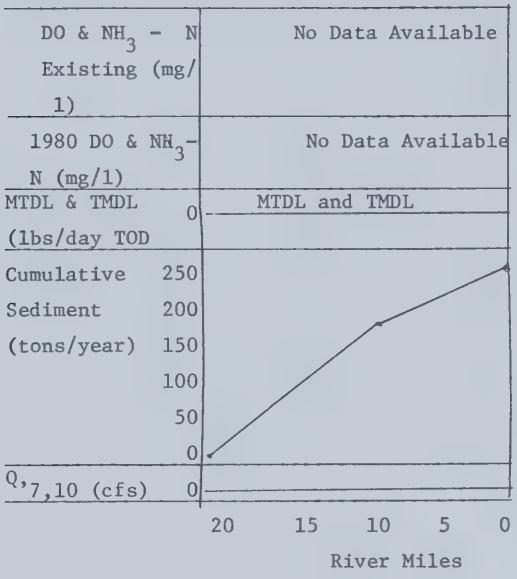
Exhibit B-39.1g Licking River Basin

Segment No. 40 Upstream Segments: 40

Downstream Segment: 36

Mainstem: Elk Fork





SEGMENT NO. 40 ANALYSIS

Classification: WQL Priority: 141.7

Description

The location of Segment No. 40 is shown in the Segment Map of Exhibit B-0.6m , and Exhibit B-40 .1g. The former map shows the relative position of Segment No. 40 in the River Basin, and the latter contains a map showing the segment, its tributary streams, the River Mile bounds of the stream, and data profiles referenced to the River Mile System. The profiles are presentations of cumulated parameter values (cumulated from upstream to downstream) through the segment in a continuum from segment to segment, and serve to locate by River Mile where significant sources/inputs/changes occur in terms such as: 1980 population, employment and housing; stream slope; 7 day Q_{10}; predictions of DO (dissolved oxygen) and NH_3-N (ammonia nitrogen) concentrations as predicted by the State proposed 1980 point source treatment levels in the Segment; and predicted annual water quality model for existing and proposed annual suspended sediment transport. The waste discharges to Segment No. 40 are listed in Exhibit B-40.4t.

Character of Segment

Basic Planning Data

The basic planning data for Segment No. 40 (population, housing units, employment, and land use) are presented in Exhibit B- 40.2t and profiles of 1980 data are presented in Exhibit B-40 .1g. In reference to the profiles, the major factors in the trends in the development and economic activities of the Segment are the centers at:

Salyersville - Municipal - RM 270

This Segment encompasses 200 square miles of which 2.0 percent is projected to be urbanized by 1980.

Segment Hydrology

The segment hydrology used for modeling purposes is illustrated in the profile of Exhibit B-40.1g. The 7 day Q_{10} flow of 0 cfs at the upstream of the segment (RM 304) increases to .138 cfs at the downstream (RM 256). The total flow augmentation within the Segment is 0 cfs.

Water Quality

The character of the DO and NH_3-N concentration profiles through the Segment under existing and proposed (1980) treatment levels is illustrated in the profiles of Exhibit B- 40.1g, as determined in the stream model analysis. That the predicted 1980 DO and NH_3-N concentrations are maintained within the specified stream standards ($\geq$ 5.0 mg/l DO and $\leq$ 4.0 mg/l NH_3-N) under 1980 treatment requirements is apparent from inspection of the profiles.

No information was obtained (Exhibit B- 40.3t) with which to document the historical record of standards contraventions in Segment 40 .

Point and Nonpoint Source Discharges

The point source discharges in Segment 40 are listed and characterized in Exhibit B- 40.4t. The total waste flows from the point sources is .08 mgd. The identified nonpoint sources in the Segment are shown in Exhibit 4.8m, and the solid waste disposal sites are listed in Exhibit 4.9t. No assessment could be made of the amount and character of pollutants from specific nonpoint sources; however, an estimate of the annual suspended sediment burden generated in/transported through the Segment is presented in Exhibit B- 40.1g to exemplify the magnitude of the erosion/soil loss management problem.

Segment Water Quality Management Strategy

Waste Load Allocations and Priorities

The waste load allocations for Segment No. 40 were developed with the objective of meeting the stream quality requirements of the State of Kentucky (Chapter IV) by 1980, and are presented in Exhibit B- 40.5t. Presented in this Exhibit are the total maximum daily loads, proposed (1980) effluent characteristics, and priority ranking for each discharger. The total maximum daily load to the Segment (20 lb/day of TOD) is compared with the maximum theoretical load of 44 lb/day of TOD. The segment priority assigned to Segment 40 is 141.7.

Municipal Needs

The municipal needs to meet the 1980 compliance goals in Segment No. 40 are presented in Exhibit B- 40.6t.

Segment Strategems

Segment No. 40 contains the uppermost 48 mile reach of the mainstem of the Licking River and the majority of the coal mining activities in the Basin occurs in this Segment. Salyersville is the major urbanized area in the Segment and has been designated as a 201 Facilities Planning area. Because the rate at which the coal deposits of this Segment are tapped will be a function of many circumstances outside the control of the State of Kentucky, an important priority of subsequent 303(e) Planning cycles will be the development of the management strategies to maintain the water quality of the Segment as the coal deposits are developed.

Exhibit B-40.2t

L I C K I N G R I V E R B A S I N

S E G M E N T 40 B A S I C P L A N N I N G D A T A

	PROJECTION YEARS			
	1970	1975	1980	1995
POPULATION				
TOTAL	6956	7465	7979	9467
RURAL	5686	6108	6535	7797
FARM	2132	2290	2456	2924
NON-FARM	3554	3818	4084	4873
URBAN	1269	1357	1444	1670
HOUSING UNITS				
TOTAL	2098	2357	2657	3788
RURAL	1655	1863	2105	3019
URBAN	443	494	552	769
EMPLOYMENT				
TOTAL	1025	1364	1724	2274
MANUFACTURING	36	76	117	153
NON-MANUFACTURING	988	1307	1607	2121
LAND USE				
TOTAL	199	199	199	199
RURAL	196	195	195	195
AGRICULTURE	33	32	32	32
SILVICULTURE	159	157	157	157
MINING	5	5	5	5
URBAN	1	4	4	4

Existing B-40.4t - Existing Point Source Discharge Characteristics - Licking River Basin

Code Number	Facility	Location	NPDES Permit No.	Type of Treatment	Q7-10 (cfs)	Discharge Characteristics (mg/1)			
						Flow (mgd)	BOD	SS	NH_3
05174	Salyersville	Licking River 511.2/269.7	0026867	Extended Aeration	.015	0.07	30	30	2
05175	Standard Oil Station	Burning Fk./Licking River 511.2/269.9/1.48	N.I.	Septic Tank	.014	0.0005	175	120	30
05176	Texaco Service Station	Burning Fk./Licking River 511.2/269.9/1.52/0.08	N.I.	Extended Aeration	.005	0.0008	40	40	10
05177	Appalachian Motel	UT - Burning Fk./Licking River 511.2/169.9/1.52/0.1	N.I.	Extended Aeration	0	0.0032	40	40	10
05178	Parkway Motel	UT - Burning Fk./Licking River 511.2/269.9/1.65/0.1	N.I.	Extended Aeration	0	0.004	40	40	10
05179	Millard Hensley Elementary School	Licking River 511.2/252.05	N.I.	Extended Aeration	.138	0.004	40	40	10

Exhibit B-40.5t - Waste Load Allocations (1980) - Licking River Basin

Code Number	Facility	Maximum Daily Waste Load lb/day	Proposed Effluent Characteristics/Load Reduction					Priority
			Flow (mgd)	BOD (mg/1)	SS (mg/1)	NH_3 (mg/1)	DO (mg/1)	
05174	Salyersville	6.67 BOD	0.08	10/95%	10/96%	1/96%	8	87.1 Ca
05175	Standard Oil Station	0.04 BOD	0.0005	10/95%	10/96%	1/96%	8	--------
05176	Texaco Service Station	0.08 BOD	0.0009	10/95%	10/96%	1/96%	8	--------
05177	Appalachian Motel	0.30 BOD	0.0036	10/95%	10/96%	1/96%	8	--------
05178	Parkway Motel	0.38 BOD	0.0045	10/95%	10/96%	1/96%	8	--------
05179	Millard Hensley Elementary School	1.13 BOD	0.0045	30/85%	30/88%	20/20%	4	--------
	Segment 40	8.6 BOD						141.7

Exhibit B-40.6t - Municipal Needs - Licking River Basin

Code Number	Facility	1980/1995 Treatment Needs	Cost	Compliance Goals
				1977
05174	Salyersville			
	Treatment	T4B	226,000	
	Interceptors	N.A.	210,000	
	Collectors	N.A.	459,000	
	Infiltration & Inflow	N.A.	36,000	

Exhibit B-40.1g Licking River Basin

Segment No. 40

Upstream Segment:--

Downstream Segment: 36

Mainstem: Licking River

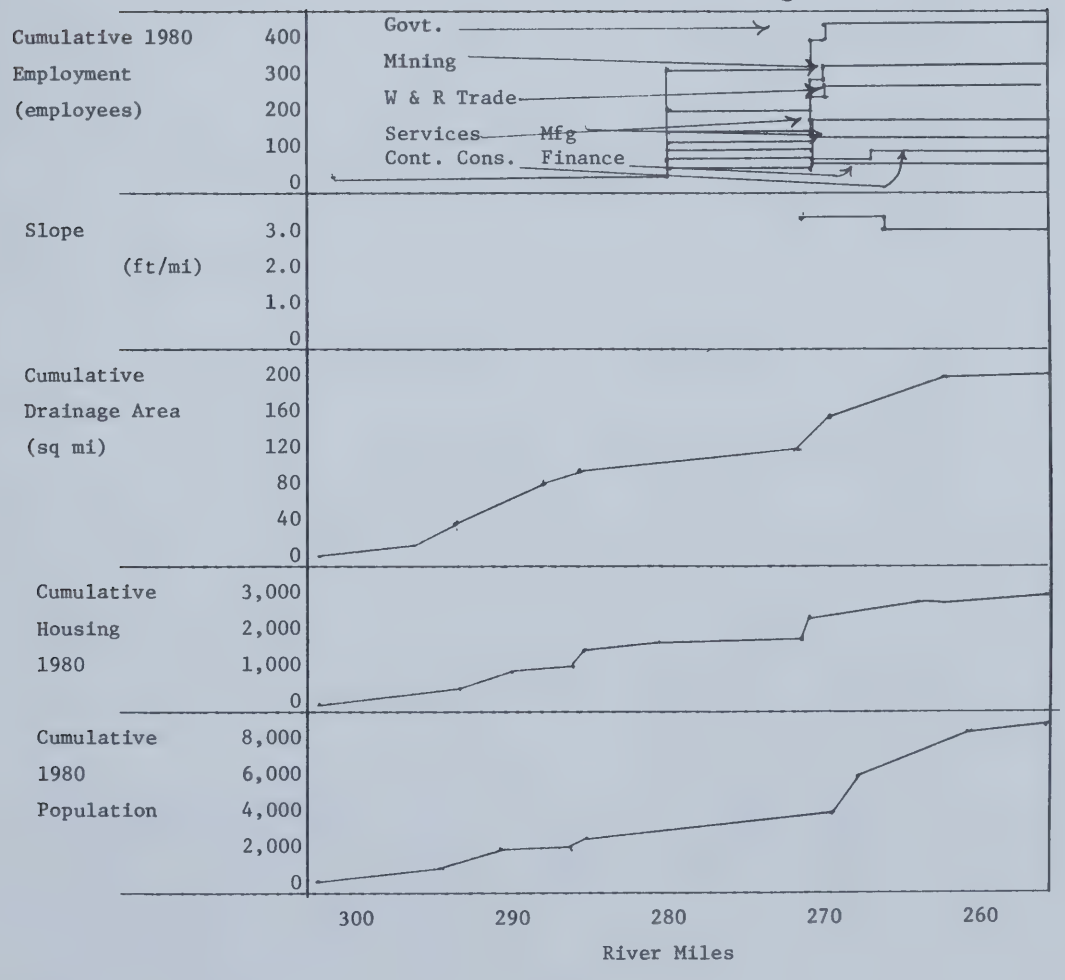
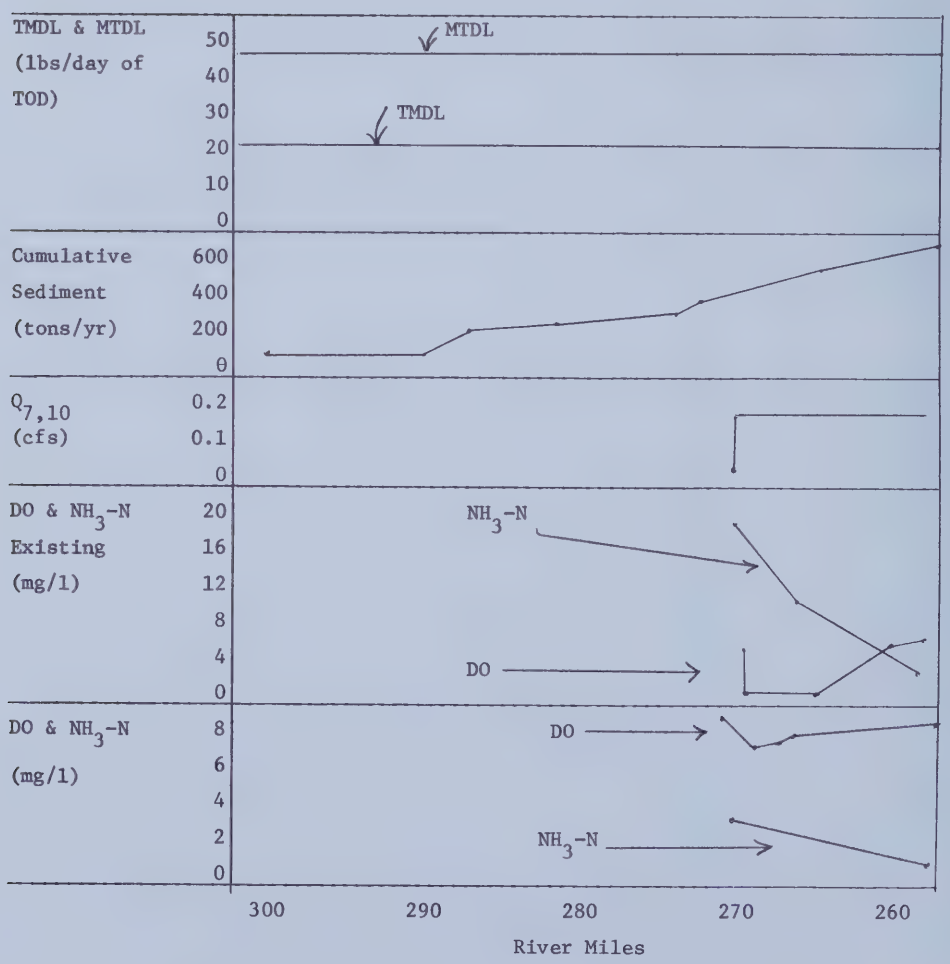


Exhibit B-40.1g Licking River Basin

Segment No. 40 Upstream Segments: 00

Downstream Segment: 36

Mainstem: Licking River



Appendix C

DEFINITION OF TERMS

The purpose of this appendix is to familiarize the reader with technical terms used in this report.

ADAPT - a computerized design and management system developed by W. E. Gates and Associates and used in the 303(e) Planning process as a means of storing, accessing and using land based data. Name stands for Areal Design and Planning Tool.

Assimilative Capacity - The amount of pollutants that a stream may receive and handle through natural purification processes without violating a particular water quality standard.

Best Practicable Treatment (BPT) - Level of treatment that can be practicably achieved using current technology. This is the mininum treatment that is required of all dischargers by 1977.

BOD - (Biochemical Oxygen Demand) - The amount of oxygen consumed in oxidizing the carbonaceous contents of a waste discharge. BOD_5 refers to the oxygen usage in 5 days; BOD_{ult} the ultimate (total) usage. BOD is frequently used as a measure of the level of organic pollutants in water.

DO - (Dissolved Oxygen) - The amount of oxygen (O_2) dissolved in water. DO is frequently used as a measure of the organic quality of water - a value of DO close to saturation representing a high quality water.

Effluent Limited Segment - A segment which will meet water quality standards after the application of best practical treatment (BPT), as specified under Public Law 92-500.

Lentic - Relating to, or living in, still waters.

Lotic - Relating to, or living in, actively moving waters.

Maximum Theoretical Daily Load (MTDL) - The maximum amount of pollutants (as measured by total oxygen demand) that a segment may receive without violating water quality standards without regard to specified waste loading patterns.

Municipal Needs - The total capital funding required for the construction of public owned treatment sewerage works.

Municipal Priority Ranking - A statewide ordering of municipal dischargers.

National Pollutant Discharge Elimination System (NPDES) - The national system for issuing permits controlling all discharges to the nation's waters.

NH_3-N - Ammonia concentration reported in terms of elemental nitrogen.

Nonpoint Source - Pollutants that enter a stream or body of water in a spatially diffused manner.

Point Sources - Pollutants that enter a stream or body of water at a concentrated location.

Public Law 92-500 - A law passed in 1972, called the Federal Water Control Act Amendments of 1972, with the goal of attaining zero discharge of pollutants to navigable waters by 1985.

Schedule of compliance - Remedial measures to be accomplished and a sequence of actions or operations leading to compliance with applicable limitations and standards.

Segment - The basin geographical management unit used in 303(e) Planning.

Segment Priorities - A statewide ranking of segments.

Significant Discharge - A point source discharge for which timely management action must be taken in order to mee t the water quality objectives for the Basin.

Stream model - A mathematical representation of the physical processes within a stream, used to predict the response of a stream under varying conditions.

Total Maximum Daily Load (TMDL) - The summation of all allowable waste discharges in a segment.

Total Oxygen Demand (TOD) - The total oxygen required to oxidize the carbonaceous and nitrogenous materials present in a waste discharge.

Waste load allocation - The amount/character of pollutants that may be discharged by each discharger as determined under 303(e) level planning.

Water quality limited segment - A segment which is projected not to meet water quality standards even after the application of best practical treatment (BPT).

Water Quality standards - Regulations which require certain legal limitations on the quality of streams or other bodies of water. In Kentucky the applicable stream standards are embodied in Kentucky Water Quality Control Regulations.

201 Planning - Treatment/sewer system planning as promulgated under Section 201 of PL 92-500.

208 Planning - Areawide waste treatment management planning as promulgated under Section 208 of 92-500.

303(e) Planning - River basin planning as promulgated under Section 303(e) of PL 92-500.

Appendix D

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